AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Reg. U. S. Pat. Off.
Published Weekly

Volume 78 — Number 13

Contents

C. A. MUSSELMAN, Pres.; J. S. HILDRETH, Vice-Pres. and Manager, Automotive Division; G. C. BUZBY, Vice-Pres.

OFFICES

Philadelphia—Chestnut & 56th Sts., Phone Sherwood 1424
New York—239 W. 39th St., Phone Pennsylvania 6-1100. Chicago—Room 916, London Guarantee & Accident Bldg., Phone Franklin 9494. Detroit—1015 Stephenson Bldg., Phone Madison 2090. Cleveland—609 Guardian Bldg., Phone Main 6860. Washington—1061 National Press Bldg., Phone District 6877, San Francisco—444 Market St., Room 305, Phone Garfield 6788. Long Beach, Cal.—1595 Pacific Ave., Phone Long Beach 613-238.
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Executive Offices
Chestnut and 56th Streets, Philadelphia, Pa., U. S. A.

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AUTOMOTIVE INDUSTRIES

March 26, 1938
Vol. 78, No. 13

Production

Sharp Rate Boost Needed for 700,000 First Quarter Mark

Seasonal improvement in retail sales of passenger cars and trucks, normally reflected in increased production schedules by this time in March, was not sufficiently apparent to influence the current week's output which remained about on a par with that of the previous two weeks.

Unless the production rate is boosted sharply next week, and there are no indications that it will be, the industry will finish March with an output unofficially estimated at around 250,000 units, which means that the total for the year's first quarter will be under 700,000.

March has shown a slight improvement over February but the increase has not been as great as in the past few years. This week's output will approximate 54,000 cars and trucks with General Motors units accounting for 21,000, Chrysler Divisions 13,500 and Ford about 9000. Schedules of independent producers also remained about the same as a week ago.

(*Turn to page* 434, *please*)

Studebaker Export Honors Foreign Dealers

Most dramatic and ingenious overseas presentation of the 1938 line of Studebaker automobiles was made by Erique Distlevsen & Cia, Ltda., Buenos Aires, Argentina, automotive magazine editors and New York newspaper automobile editors decided Tuesday. A five-to-four vote of the editors broke the deadlock of judges of the Third Annual Contest, staged by Studebaker Export Corp., who found the Argentine and Dutch claimants tied for first place. N. V. Internationale Automobiel, Maj., The Hague, The Netherlands, was awarded second place; Morris Bros., Mexico City, Mexico, won third, and Auto Mercantil, Rio de Janeiro, Brazil, was fourth in a field of more than 300 contestants.

The decision was made at a luncheon given by Arvid Frank, president of the export company aboard the Grace Liner *Santa Elena*, Mr. Distlevsen's firm has won two of the three contests.

PAUL G. HOFFMAN

. . . president of the Studebaker Corp. and the Automotive Safety Foundation, who last week was presented with the $5,000 annual grand award of the C.I.T. Safety Foundation at a dinner at the Waldorf-Astoria hotel in New York City.

Mr. Hoffman declined the monetary award and on his suggestion the $5,000 was turned over to the Automotive Safety Foundation. He further recommended to the trustees that the money be given to Norman Damon, director, and C. C. Magill, charge of public relations; $4,000 to the former and $1,000 to the latter.

Mr. Hoffman discusses highway safety problems in the March 26 issue of the *Saturday Evening Post* in a feature article written by Neil Clark, staff contributor.

On the same occasion, B. E. Hutchinson, chairman of the board of the Plymouth Motor Corp., accepted the Foundation's bronze plaque awarded his corporation for the best institutional motion picture film on traffic safety. The film entitled "The Chance To Lose" was selected for this honor.

Labor

UAW Files Petition With NLRB Seeking Chrysler Election

Daily conversations between representatives of United Automobile Workers and the Chrysler Corp. with reference to the contract which expires on March 31 still were in progress this week with no indication as to when results would be announced.

The conferences are being held in the corporation's Highland Park headquarters with representatives of both sides making no comments when meetings break up at noon and in the evening.

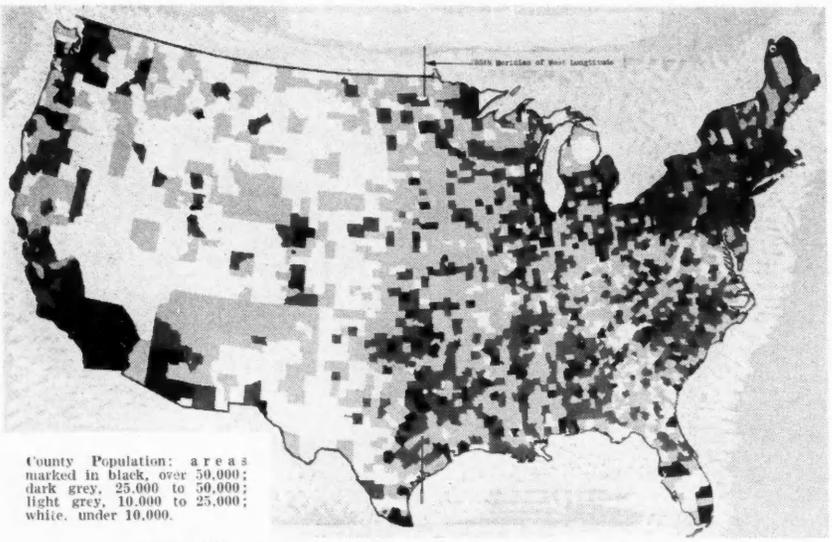
Hudson Local No. 154 of the UAW has a nine-man committee which has been conferring with Hudson officials relative to the agreement which expires on April 8, with conversation thus far understood to be confined to details of procedure in anticipation of any negotiations which may take place.

The UAW has filed with the National Labor Relations Board a petition asking for an election among Chrysler employes to uphold the union's right to act as sole bargaining agent for the 85,000 hourly-rate employes of the corporation in plants throughout the U. S. The UAW petition, according to R. J. Thomas, UAW vice-president in charge of Chrysler locals, was filed in answer to a petition filed several weeks ago by the Independent Association of Chrysler Employes, also asking for such an election to determine what union should represent employes in negotiations with the corporation.

These petitions for elections will have no effect on the current Chrysler-UAW conversations, it is understood. If granted by the NLRB the election will be one of the largest ever held. However, unless all parties concerned, including the corporation, consent to an election the

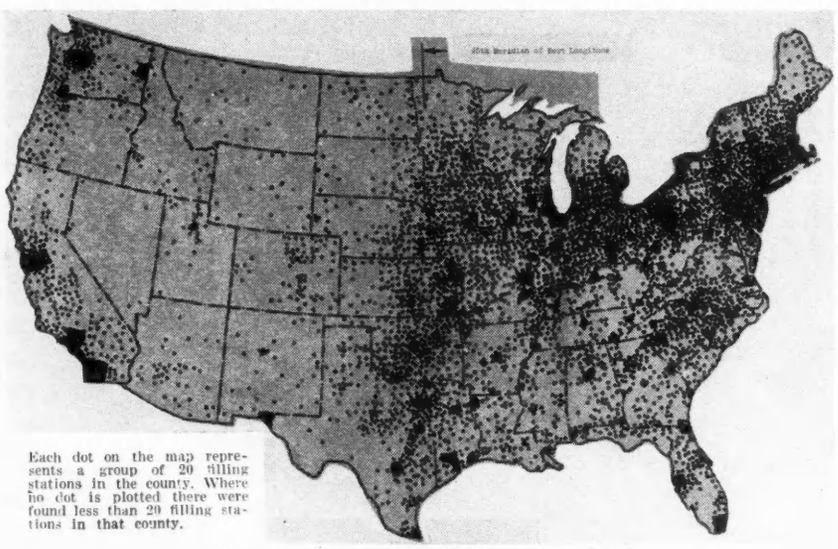
(*Turn to page* 439, *please*)

Where Do They "Go To Market?"



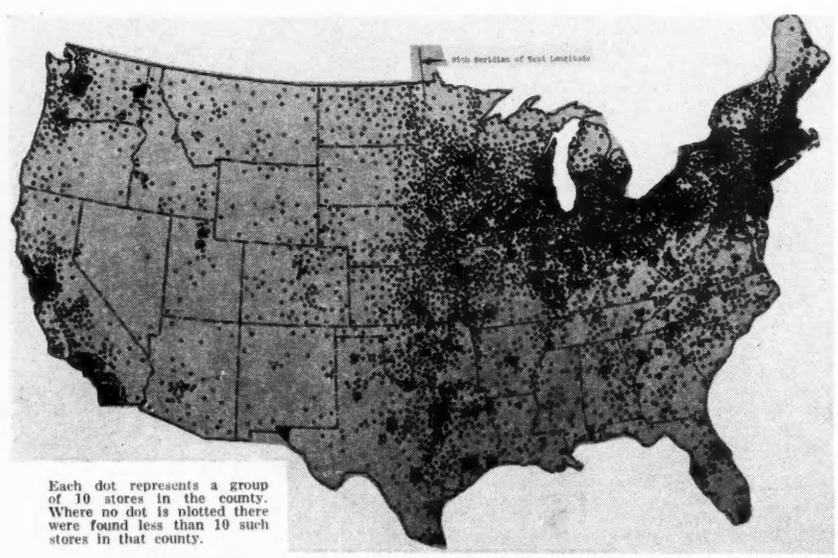
County Population: areas marked in black, over 50,000; dark grey, 25,000 to 50,000; light grey, 10,000 to 25,000; white, under 10,000.

Location of Population in the United States, 1930



Each dot on the map represents a group of 20 filling stations in the county. Where no dot is plotted there were found less than 20 filling stations in that county.

Concentration of Filling Stations, 1935



Each dot represents a group of 10 stores in the county. Where no dot is plotted there were found less than 10 such stores in that county.

Concentration of Automotive Stores and Dealers *(excluding filling stations) 1935*

Potential Markets Charted In Series of 16 Maps

Potential markets in the United States for all types of consumer merchandise are shown graphically in a series of 16 maps which originally appeared in *Domestic Commerce* and have just been made available by the Marketing Research Division, Bureau of Foreign and Domestic Commerce in a pamphlet entitled "Patterns of Stores, Sales, and Population in the United States." Three of the maps are reproduced herewith: Location of population in the United States, 1930; Concentration of filling stations, 1935; and Concentration of automotive stores and dealers (excluding filling stations), 1935.

Main purposes of the maps are outlined by Alexander V. Dye, director of the bureau, as follows: (1) to present a general picture of the location of potential markets in order that manufacturers and distributors may more definitely locate and better view localities in which opportunity for sales is large, and (2) to point out the fact that rural markets cluster in a pattern not unlike the pattern of urban markets and that, therefore, distributors located in the towns, which they serve, may also serve the larger part of the rural market which, it is found, is contiguous to the towns.

As pointed out by Mr. Dye, the maps introduce new criteria into the field of market analysis. For example, the ninety-fifth meridian of west longitude is observed to divide the country into two main parts, one of which is vast in area but low in population, sales, and the total dollar income which is the potential for retail sales. The other, smaller in area, is larger in dollar income, dollar retail sales, and potential opportunity for distributors.

Copies of the pamphlet, further identified as Market Research Series No. 18, are available from the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., for 10 cents.

Houdaille-Hershey to Pay 62½ Cents Per Share

Houdaille-Hershey Corp. has declared the regular quarterly dividend of 62½ cents per share on its Class A No Par Value stock, payable

April 1, 1938, to stockholders of record at the close of business on March 26, 1938.

Action on the dividend usually payable at the same time on the Class B stock was deferred.

Revise Race Rules

AAA Contest Board Lifts Weight Restrictions

A revision in international formula specifications applying to dirt track racing cars has been announced by the Contest Board of the American Automobile Association. The revision eliminates the "Formula" weight requirements based on engine sizes on all dirt track cars participating in non-championship races, but retains the maximum limits of engine capacities (cubic inch displacement) allowed under the formula.

During the 1938 season, therefore, unsupercharged engines of more than 274.59 cu. in. and supercharged engines of more than 183 cu. in. will not be permissible in any sanctioned race. This ruling does not affect the specifications for championship races in which all requirements of the formula are to be observed.

Details on the International Formula Motor Specifications for dirt track races were published in AUTOMOTIVE INDUSTRIES, Feb. 26, page 314.

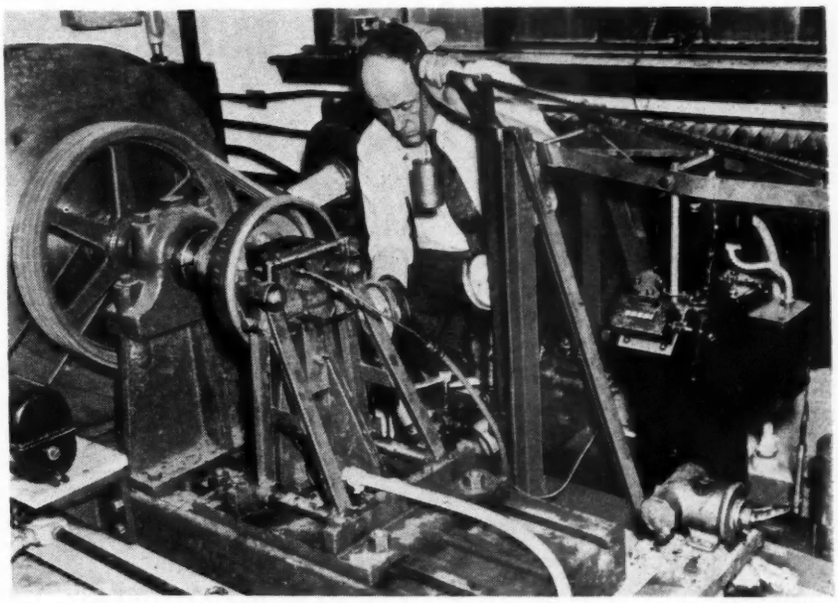
Carboloy Co., Inc., to Build $500,000 Detroit Plant

Construction of a new factory and general offices to cost approximately $500,000 is being undertaken by the Carboloy Co., Inc., Detroit, manufacturer of cemented carbide tools and dies.

The new plant will accommodate the entire manufacturing facilities of Carboloy plants now operated in three separate units at Cleveland, Ohio, Stamford, Conn., and Detroit, Mich. The new structure, which will be ready for occupancy in the fall of 1938, will comprise three units covering an area of 138,000 sq. ft.

Manufacturing facilities will be housed in a one-story building with an area of about 100,000 sq. ft. A two-story structure of 18,000 sq. ft. for the research laboratories and factory offices will adjoin the plant. In addition to these two units a two-story general office building is to be erected.

Site of the new plant is a 40-acre tract of land on the north side of 8-Mile Road, one-half mile east of Van Dyke, Detroit.



Harris & Ewing Photo

BRAKE LININGS will be studied under conditions closely approximating those of actual service on this new machine which has been installed at the National Bureau of Standards, Washington, D. C. The new equipment will simplify the work of revising Federal Government's specification for automobile brake linings.

To Test Brake Linings

National Bureau of Standards Installs New Machine

Information that will simplify the work of revising the Federal Government's specification for automobile brake linings is being obtained from a new testing machine recently installed at the National Bureau of Standards, Department of Commerce. Although the machine includes many features that have been used for a long time by manufacturers of brake linings in testing their products, it is, nevertheless, a new device both in design and operation. It incorporates the ideas of an advisory committee of experts in the manufacture and use of linings who assisted in working out the details.

A horizontal shaft carries a brake drum at each end with a pulley and flywheel near the middle. The pulley is driven by an electric motor through a multiple V belt. The flywheel is so constructed that metal disks can be added to or taken from it to change its weight. The amount of inertia of the system consisting of shaft, drums, pulley, flywheel, and motor can, therefore, be varied to represent that of any given automobile from a car weighing 3600 lb. up.

The samples of lining (8 sq. in. in area) are forced against the drums by internal shoes in each drum, operated by standard hydraulic brake cylinders.

A system for applying pressure to the brake cylinders in turn, and the necessary switches and relays to control the motor, with recording devices, complete the installation.

The machine automatically performs the following cycle of operations: The motor starts and accelerates the shaft, flywheel, and brake drums to any desired speed up to 600 r.p.m. (representing 60 m.p.h., car speed); the current is shut off, and one of the brakes is applied, bringing the shaft to a stop in a certain time which is recorded automatically on a chart; a small motor turns a valve, cutting out the brake that has just functioned and connects the other to the line; the main motor starts again, accelerates the shaft as before, the current is shut off, the second brake is applied, and the time to stop is recorded as before. This cycle is repeated automatically at any desired interval (usually once a minute) for as long as necessary.

Doehler to Pay Dividend

Doehler Die Casting Co. has declared a dividend of 20 cents a share payable April 1 to holders of record March 18. Net earnings $989,284 or $3.45 a share on common were reported for 1937 as compared with $31.19 a share for 1936.

Willys Declares Dividend

Willys-Overland Motors, Inc., has declared a regular quarterly dividend of 15 cents a share on preferred stock of which there are 320,778 shares $10 par value outstanding. It is payable April 1 to holders of record March 25.

MEN OF THE INDUSTRY

GEORGE T. MAHANEY and JAMES D. PLATT have been appointed eastern and western retail sales manager respectively of the Diesel Engine Division of the General Motors Sales Corp.

S. S. MARVIN has been promoted to district manager of the American Bantam Car Co., Butler, Pa., covering Kentucky and Tennessee. Mr. Marvin joined the Bantam sales force in October, 1937, in the fleet sales division.

EUGENE GRUENEWALD has been elected president of the Ross Gear and Tool Co. Mr. Gruenewald succeeded David E. Ross, who was named chairman of the Board of Directors. **A. F. KANNE** and **ROY M. RESER** have been re-elected treasurer and secretary respectively of the company.

DR. H. W. GILLETT, chief technical advisor, Battelle Memorial Institute, Columbus, Ohio, has been chosen to deliver the 1939 Howe Memorial Lecture of the American Institute of Mining and Metallurgical Engineers.

FRANK A. SHARPE, for 20 years Detroit representative of the Thermoid Co., has resigned from that organization.

LESTER W. TARR, recently appointed to the executive staff of United-Carr Fastener Corp., has been placed in charge of directing production and marketing of the corporation's new and improved laminated phenolic insulation.

E. J. POAG, director of advertising and merchandising, Dodge Division of Chrysler Corp., has returned to his office after a five weeks' absence made necessary while recuperating from an appendectomy.

MAURICE W. HOWE, manager of the Buffalo assembly plant of Chevrolet, has been named to fill an unexpired term on the board of directors of the Buffalo Chamber of Commerce.

HERBERT P. BAGLEY

. . . pioneer manufacturer of industrial oils and lubricants who recently observed the fiftieth anniversary of the White & Bagley Co., Worcester, Mass., which he and the late Frederick W. White founded. Frederick L. Rushton, writing in the *Worcester Sunday Telegram*, said of Mr. Bagley, "Not a chemist, not a graduate of an engineering school, with no experience in the oil business other than that of a short period of employment as a salesman for a Boston concern, Mr. Bagley was one of the first in the country to recognize the need of special industrial oils and lubricants and to set himself to the task of inventing them and devising methods of manufacture. . . ."

Mr. Bagley developed three products which formed the backbone of his business. First of these was a product effective as lard oil which could be diluted to form a lubricant at a cost of three cents a gallon whereas lard oil at the time cost from 60 to 70 cents a gallon. Then, at the request of the Norton Co., he developed a special grinding lubricant. And, in 1905, he produced his first automobile engine oil. In 1912 he made a high grade motor oil which became a favorite with the country's racing champions. Since that time Mr. Bagley has expanded his business to invade dozens of industrial fields with special oils, greases, lubricants, and cleansing preparations.

Federal Agencies Seek Solution of URW-Goodrich Controversy

Two government agencies March 21 plunged into the job of trying to find an amicable solution of the wage, hour and decentralization controversy of the B. F. Goodrich Co. and the United Rubber Workers Union, following an eleventh hour cancellation of the vote of the United Rubber Workers Union on March 20 on the Goodrich proposal that employes accept substantial wage cuts to prevent further decentralization and the transfer of 5000 Goodrich jobs out of Akron.

Announcement of indefinite postponement of the vote was made by L. L. Callahan, president of the Goodrich URW local, at a mass meeting of more than 10,000 rubber workers in downtown Akron on March 19. The action followed charges by the URW against Goodrich of alleged "intimidation of coercion" of employes, and a protest against the employe referendum, filed with government agencies by a special delegation of Akron business men who made a personal trip to Washington.

The two federal agencies injected into the controversy are the National Labor Relations Boaord and the U. S. Department of Labor.

Export Heads Entertain Pierre Vasseur

A group of automobile export executives entertained Pierre Vasseur, general secretary of the International Chamber of Commerce at a luncheon Tuesday. M. Vasseur discussed highway transport problems, and efforts of several European governments to coordinate their rail and highway services.

Among the hosts were Arvid Frank, president of Studebaker Export Corp.; B. C. Budd, vice-president and general manager, Packard Motors Export Co.; R. L. Vaniman, Chrysler Export Corp.; R. J. Archer, general manager, Willys Export Corp.; H. M. Salisbury, exports sales manager, Nash Division, Nash-Kelvinator Corp.; L. R. Boughton and G. B. Blakely, White Motor Car Export executives; Alfred Reeves, vice-president and general manager, American Automobile Association, and George Bauer, secretary, A.M.A. export committee.

Detroit to Honor Ford

Detroit will honor Henry Ford during the last two weeks in July in a special celebration to commemorate the veteran automotive leader's seventy-fifth birthday, according to action taken by the Detroit city council on March 22.

Willys Announces New Sedan

Production of a new sedan was announced this week by Willys. The new model will be known as the Clipper Family Sedan and delivered price at Toledo, Ohio, before Federal or State taxes and transportation costs, is set at $549.

Production

(*Continued from page* 431)

J. B. Graham, president of Graham-Paige Motors Co., announced this week that his company expects to step into immediate production of finished cars in the near future as the result of a meeting with major suppliers at which a committee was named to develop plans for refinancing which will permit filling of orders now on hand and anticipated. The company's car production lines have been down for the past month although it has been at work producing Graham-Bradley tractors on a contract with Sears, Roebuck & Co.—J. A. L.

. . . slants

MORE MOHAIR—*Of the total of 14,000,000 lb. of mohair produced in the United States in 1937, the 3,111,000 Angora goats in Texas supplied 16,558,000 lb., according to a report submitted to the United States Department of Agriculture. The mohair crop of Texas last year was more than 3,000,000 lb. larger than in 1936 when 13,400,000 lb. were sheared.*

In recent years there has been a

large increase in the demand for mohair for use in upholstering of automobiles, as pointed out in the article "Upholstery Fabrics Are Engineered Too," by Herbert Hosking, Automotive Industries, Oct. 16, page 512.

GOOD NEWS—*"It should be of interest to everyone to know of studies now being made to develop an automobile horn that will be satisfactory to motorists and pedestrians alike and at the same time help abate the nuisance of street noise," said Alfred Reeves, vice-president and general manager of the Automobile Manufacturers Association in addressing the annual Award Dinner of the C.I.T. Safety Foundation held this week.*

ROADS OF MOLASSES—*Experiments conducted by the Imperial Institute of Sugar Technology of India are reported to have revealed the practicability of converting molasses into an insoluble resinous product suitable for use as road surfacing material, according to a report to the Department of Commerce by the office of the American Trade Commisioner at Calcutta.*

The process involves the resinification of molasses with a mixture of coal tar and asphalt in presence of acids, the report stated. It is claimed that the cost of manufacture per ton of this material is about one-third the cost of a ton of asphalt.

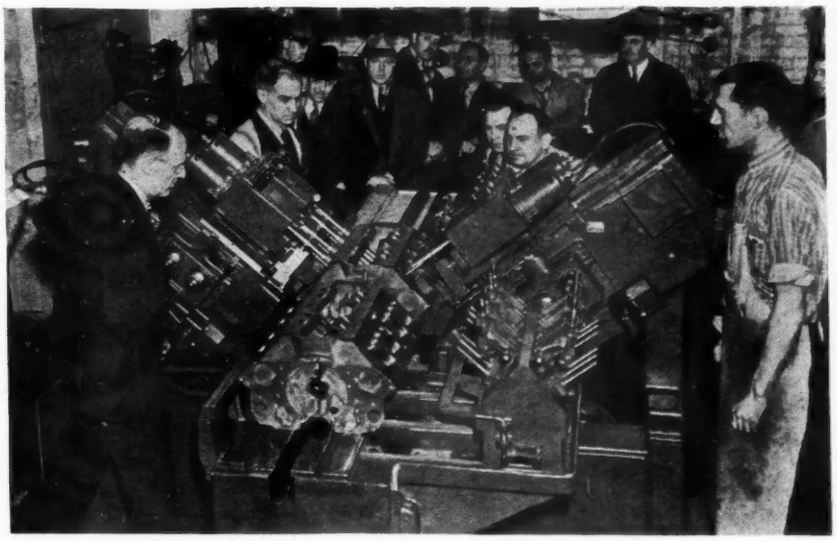
Hearings Begin on New Measure to Widen Scope of Wagner Act

Broadening the scope of the Wagner Labor Act to bring under its provisions recipients of Government contracts and Federal loans is the objective of a Wagner-sponsored measure on which hearings started on Monday.

J. Warren Madden, NLRB chairman, told the Senate Education and Labor Committee during the public hearing that the effects of the bill would be "most desirable." Senator Wagner followed with the promise that the bill would "guarantee fundamental industrial liberties already firmly established in our national life."

Under its provisions, holders of Government contracts, those borrowing money through Government facilities, and recipients of Federal grants would be required to adhere to the Wagner Act despite the intrastate character of their business just as Government contractors are now required under the terms of the Welsh-Healey Act to follow wage and hour regulations formulated by the Government Contracts Board in the Labor Department.

Violators would be penalized by cancellation of the contract or of the loan as the case may be.



VALVE SEAT GRINDING

machine recently built by the Hall Mfg. Co., Toledo, Ohio, for the Ford Motor Co. The new piece of equipment eliminates lapping operations and will grind the 16 valve seats in a V-8 cylinder block in 50 sec. It has a block with diamond points for dessing the abrasive wheel to proper pitch and the dressing operation requires only 30 sec.

Ernest A. Hall, president of the Hall Mfg. Co., appears in the picture at the lower left.

Firestone Vote Will Test CIO

The CIO, which has won collective bargaining rights at the Goodyear and Goodrich factories in Akron through the United Rubber Workers Union of America, will meet the acid test of its strength in the rubber industry March 29-30 when employes of the Firestone Tire & Rubber Co. in Akron will vote whether they want the United Rubber Workers or the newly organized Firestone Employes Protective Association to constitute their collective bargaining agency. The United Rubber Workers has held no collective bargaining referendum at Firestone as the company signed a contract with the United Rubber Workers at the conclusion of the eight weeks' Firestone strike a year ago. This contract expires April 28.

James P. Miller, regional director of the National Labor Relations Board, will supervise the election. The new Employes Protective Association was organized several months ago and has grown steadily. Membership in it carries a pledge against unauthorized strikes. Association officials have staged a vigorous membership campaign and predict that by the time for the election it will have a majority of Firestone employes enrolled as members.

Biggest February for GM Overseas Sales

Sales of General Motors cars and trucks to dealers in the overseas markets during February totaled 30,335 units, the highest February volume on record, and were 10.3 per cent greater than sales in February of last year.

In the first two months of 1938, sales of 60,190 units were also at a record volume level and represented an increase of 10.5 per cent over sales in the first two months of 1937.

These figures include the products of the Corporation's American, Canadian, English, and German factories sold outside of the United States and Canada.

40 Years Ago

with the ancestors of AUTOMOTIVE INDUSTRIES

The Horse Power Needed

"Again it seems necessary to impress upon our readers that the term horsepower does not mean all the power that can be exerted by a horse for a sudden pull, as in starting a load out of a rut or climbing a steep hill, but the force necessary to raise 33,000 lb. one foot from the earth in one minute. One horse can exert three or four horsepower for a brief period, though it cannot sustain the effort."

From *The Horseless Age*, May, 1898.

Business in Brief

Written by the Guaranty Trust Co., New York

A moderate improvement occurred in some branches of business activity last week. The index compiled by the *Journal of Commerce* stood at 70.5, as compared with 69.8 the week before and 102.6 a year ago. There were increases in steel production, automotive activity, bituminous coal output, and car loadings. Retail sales were from 9 to 16 per cent below those in the corresponding period last year.

Freight Loadings

Railway freight loadings during the week ended March 12 amounted to 556,664 cars, which marks an increase of 3748 cars above those in the preceding week, a decline of 187,835 cars below those a year ago, and a drop of 60,273 cars below those two years ago.

The retail cost of food fell 2.3 per cent during the period from Jan. 18 to Feb. 15, according to the Bureau of Labor Statistics. Declines were recorded in 60 of the 84 items included in the index. The current index number is 7.2 per cent below that a year ago.

The weakness in consumer buying power was reflected in store chain sales in February. The index for that month showed a decline of 3 per cent below that a year ago. A moderate gain was registered by the variety chain group.

According to the Board of Governors of the Federal Reserve System, the adjusted index of department store sales during February stood at 88, as compared with 90 in the preceding month and an average of 92 for 1937.

Production of electricity by the electric light and power industry in the United States during the week ended March 12 was 9.0 per cent below that in the corresponding period last year.

Construction contracts awarded in 37 eastern states during February amounted to $119,038,000, according to the F. W. Dodge Corp. The current figure marks a decline of 37 per cent below that a year ago. The total for January was 20 per cent below that in the corresponding period last year.

Fisher's Index

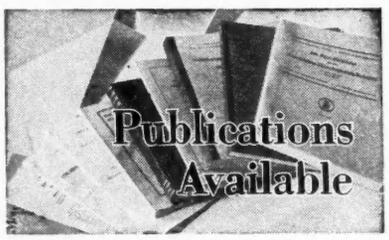
Professor Fisher's index of wholesale commodity prices for the week ended March 19 stood at 82.5, as compared with 82.8 the week before and 83.0 two weeks before.

The consolidated statement of the Federal Reserve banks for the week ended March 16 showed no changes in holdings of discounted bills, bills bought in the open market and Government securities. The monetary gold stock rose $10,000,000, and money in circulation declined $6,000,000.

Acme photo

THE MODERN WAY

—This crack motorized unit, consisting of trucks and motorcycles, is characteristic of advancement made by China in the mechanization of her military forces. China lacks the machinery to produce modern implements of war and is building an up-to-date war machine through purchases made abroad.



Description of Boeing's projected **Stratoliner,** designed to maintain a cruising speed of 215 m.p.h. at 10,000 feet, is found in an attractive brochure just issued by the Boeing Aircraft Co. with the slogan "tomorrow's airplane today."*

Good close-up photographs and descriptive detail of the Landis 3-in. Type-C **hydraulic chucking grinder** in a new booklet from the Landis Tool Co. Ask for Catalog L-38.*

Installment Finance Practices, the "6 Per Cent Plank" and The Judicial Controversy, is the title of a reprint from *The Annalist* of an article by James G. Mitchell. The reprint is published by the Automobile Manufacturers Assn.*

"The Key to Remote Control" is the title of a new folder which describes and illustrates Tru-Lay **push-pull controls** manufactured by the American Chain & Cable Co., Inc., Bridgeport, Conn.*

Pneumatic Drop Hammer Co., Boston, Mass., has brought out a bulletin describing its new pneumatic double lift gravity **drop hammer.***

Latest publication offered by the **Hyatt Bearings Division** of General Motors Corp. is entitled "Your 10 Demandments are the Hyatt 10 Commandments."*

Bakelite laminated products and their diversified applications are described in an illustrated booklet issued by the Bakelite Corp., New York.*

A catalog and insert, describing its 1938 **trailers,** has been brought out by the Covered Wagon Co., Mount Clemens, Mich.*

The National Association of Manufacturers has published a series of eight booklets under the general title **"You and Industry."** The series includes the following: No. 1, The American Way; No. 2, Men and Machines; No. 3, Taxes and You; No. 4, The American Standard of Living; No. 5, The Future in America; No. 6, At School—Not At Work; No. 7, Pattern of Progress; and No. 8, What Is Industry?*

Cobalt thread **plug gages** are pictured, described, and priced in a folder titled "Up to 40,000 More Holes," issued by the Detroit Tap and Tool Co.*

A gasoline-engine-driven **arc welder,** which uses a Ford V-8 engine as power source, is described, with its accessories, in General Electric's bulletin GEA-2776.*

"Modern Homo Tempering" is the title of a pamphlet recently published by the Leeds & Northrup Co., Philadelphia.*

The Meter Division of the General Electric Co. has brought out the first issue of a new house organ, **"Instruments In Industry."***

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

Chile Will Limit Imports of Cars by Quota

The Chilean Government has announced that the exchange situation has again made it necessary to limit the importation of passenger cars into Chile by quota, according to a cablegram received in the Department of Commerce from the American Embassy, Santiago.

Although details of the quota allocations are still being worked out, it is reported that the quota for the 12 months of 1938 will be based upon imports for the full preceding 15 months plus 10 per cent, making a total of 1984 units for the United States, plus approximately 100 units for out-ports.

Owing to the fact that a number of cars of the 1937 quota were imported during January, 1938, it is believed that the actual imports from the United States during the year 1938 will range between 2100 and 2300 units, as compared with 1516 units imported during 1937.

Financial News

Studebaker Earned Net Profits Totaled $811,874 In 1937

The Studebaker Corp. earned net profits of $811,874 for the year 1937 on sales of 91,475 passenger and commercial cars for $70,683,260.67, according to the annual report just issued. This compares with net profits of $2,187,783 in 1936 on the sale of 91,999 units for $68,928,724. The differential is accounted for by increased material and labor costs during the first nine months of 1937 and the sharp decline in sales during the fourth quarter, said Paul G. Hoffman, president. Net profits for the year amount to 37 cents per share compared with $1.01 per share in 1936.

Although an operating loss was sustained in the fourth quarter, net profits of $303,298 were shown in that period as a result of unused reserves.

Net working capital totaled $11,-

209,374 at Dec. 31, compared with $11,121,659 at Dec. 31, 1936, and $6,758,586 at Dec. 31, 1935. This increase occurred notwithstanding expenditures of more than $3,800,000 during the year for tools, dies and new factory equipment for bringing out the 1938 line.

Ratio of current assets to current liabilities was 4.4 to 1 at Dec. 31, compared with 3.1 to 1 a year previous. Cash on hand of $4,031,339 substantially exceeded total current liabilities. Net worth was set at $20,004,208. Trade name, good will, and patent rights were carried at $1.

The report states: "Current sales are at a low level. Dealers are reversing the seasonal trend by buying fewer cars from the corporation than they are selling to the public. As a result their stocks of cars and trucks totaled 8576 on Feb. 28, compared with 11,234 on Oct. 31 last, and 14,524 on Feb. 28, 1937."

The tenth annual report of the Borg-Warner Corp., Chicago, Ill., shows, for the year ended Dec. 31, 1937, a consolidated net profit—after deduction of all charges—of $8,348,088.74. The net profit for 1937 slightly tops the net of $8,326,865.13 for the year 1936, and compares with a net profit of $7,682,590.01 for the year 1929. Net income for 1937 equalled $3,626 per share on the net amount of common stock outstanding.

Current assets of the corporation, as of Dec. 31, 1937, amounted to $28,445,625.85, in this total, items of cash and marketable bonds amounted to $8,138,002.51.

Net current assets or working capital, as of Dec. 31, 1937, totaled $20,394,258.24, an increase of $1,816,463.25 over the corresponding date of the previous year. Also, the net current assets at the close of 1937 were $5,564,233.83 in excess of the corresponding figures for 1929.

Kelsey-Hayes Wheel Co. has reported in its annual statement a net profit for 1937 of $982,969.00 after all charges. This compares with a net profit of $1,030,252.52 in 1936, including a non-recurring income of $286,404.75.

Net earnings of $120,043.86, after full provision for all reserves and taxes, were reported in the annual statement for the calendar year 1937 issued by the Fansteel Metallurgical Corp. and its subsidiaries. This compares with $161,056.39 earned during 1936. The earnings for 1937 are stated after a deduction of $30,664.36 representing the net direct expense (after crediting insurance recoveries) suffered by the Company in connection with a sitdown strike. The aggregate volume of business during 1937 exceeded that of 1936 by 23 per cent and 1935 by 56 per cent.

New Truck Registrations*

New truck registration figures for January, 1938, totaled 31,343 units, a gain of 431 over the preceding month. Comparison of the first month of 1938 with January, 1937, however, shows a decrease of 32.5 per cent.

	January 1938	December 1937	January 1937	Per Cent Change, Jan. 1938 over Jan. 1937	Per Cent of Total January	
					1938	1937
Chevrolet	10,137	10,323	13,975	− 37.4	32.34	30.07
Ford	9,114	7,712	16,230	− 43.9	29.09	34.92
International	4,501	4,292	6,098	− 26.0	14.36	13.12
Dodge	3,070	3,480	3,673	− 16.5	9.79	7.90
G. M. C.	1,746	2,030	2,749	− 36.5	5.57	5.91
Plymouth	668	690	208	+221.0	2.13	.45
Diamond T	335	365	828	− 59.5	1.07	1.78
White	258	320	471	− 45.3	.82	1.01
Mack	254	313	382	− 33.5	.81	.82
Reo	216	250	344	− 37.2	.69	.74
Willys Overland	176	182	125	+ 41.0	.56	.27
Studebaker	158	182	167	− 5.5	.50	.36
Autocar	129	150	130	− 0.7	.41	.28
Federal	118	94	199	− 40.6	.38	.43
Hudson	99	88	278	− 64.4	.32	.60
F. W. D.	66	23	30	+120.0	.21	.06
Brockway	64	102	102	− 47.2	.20	.22
Divco	45	26	80	− 43.8	.14	.17
Indiana	30	58	112	− 73.2	.10	.24
Stewart	27	49	89	− 69.6	.09	.19
Pontiac	18	.....	.....	.....	.06	.....
Sterling	16	10	22	− 27.2	.05	.05
Stutz Pak Age Car	13	28	71	− 81.7	.04	.15
Miscellaneous	85	145	119	− 28.5	.27	.26
Total	31,343	30,912	46,482	− 32.5	100.00	100.00

* Does not include returns of Wisconsin. All data are on a comparable basis.

Road Congress

Delegates From 65 Countries to Meet at the Hague in June

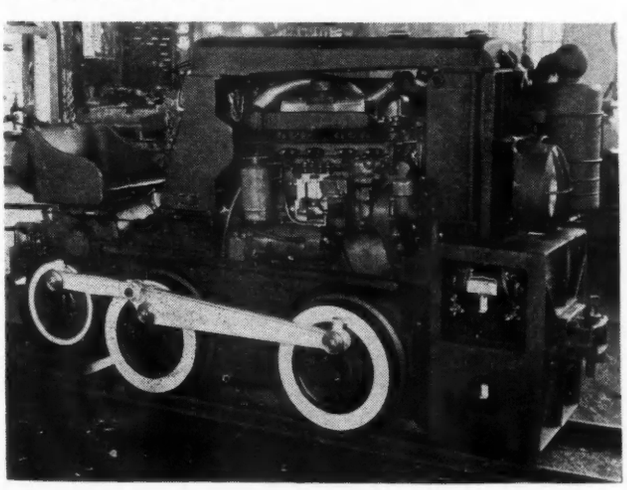
Recent progress in road construction and traffic engineering will be discussed at the Eighth International Road Congress, June 20-July 2, at The Hague, Holland, according to an announcement made by Thos. H. MacDonald, chief of the United States Bureau of Public Roads, and chairman of the American Organizing Committee for the Congress.

Problems to be considered by the Congress have been divided into two sections, one dealing with construction and maintenance, the other with use, administration and regulation. Both sections will merge for consideration of questions of mutual interest.

Technical questions listed for discussion include the use of concrete, brick, iron, steel, and rubber in road surfaces, as well as the use of tar, bitumen, asphalt, and emulsions. Effects of different types of sub-soil on the construction of roads and their subsequent maintenance will also be studied, along with methods and instruments used in testing subsoils.

Standard practices in reporting accidents and methods of investigation into causes of accidents will be explored. The advisability of segregating types of traffic, such as vehicular, bicycle and pedestrian, the development of service roads and parking areas, and the question of road junctions and crossing, are also up for consideration.

Construction of skid-resistant surfaces is listed for joint discussion by engineers and administrators, and the combined sections will consider artificial illumination and the degree to which such light is absorbed by different types of surfaces.



MINE MULE

Diesel locomotive manufactured by the Ruth Co., Denver, Colo., and designed for underground operation. The Diesel is upheld as especially desirable for this application because of the fact that its exhaust contains no carbon monoxide. According to the maker, no small part of the locomotive's performance is attributable to an automotive type brake.

Thiokol Moves Headquarters

Thiokol Corp., manufacturers of oil-proof synthetic rubber, announces that effective April 1, the general offices and laboratory of the company will be located at 870 North Clinton Avenue, Trenton, N. J. For seven years the company's plant and general offices have been situated in Yardville, N. J.

Automotive Metal Markets

Rate of Employed Ingot Capacity Best Record in Four Months as Small Lot Orders From Automotive Consumers Increase

Another 5 per cent betterment in the rate of employed ingot capacity was reported by the American Iron & Steel Institute this week, and this rate of improvement was shared by finishing mills. Steel company sales managers also report a moderate gain in small lot orders from automotive consumers, with prospects of more tonnage business coming through in the next four to six weeks. Now that the rate of primary operations has reached 33.7 per cent of capacity, the best record in four months, the steel industry looks more than ever to automotive consumption to take the lead in providing sufficient orders to restore 50 to 60 per cent of capacity operations, which, conditions being what they are, would be looked upon as very much of an achievement.

Steel producers base their confidence in a further upswing in demand before mid-summer chiefly on reports coming to them from their field men that consumers' steel reserves have now reached negligible proportions, and, this, to some extent, is also borne out by the shipping instructions that accompany orders. A good many producers fare considerably better than others, and this disparity holds also true of the several steel-making districts.

Chicago, Cleveland, Youngstown and Buffalo reported marked improvement in production schedules this week, while flat steel producers in the Pittsburgh area appear not to have done as well. Part of these irregularities, however, results from the continuing practice of many mills to adjust their rolling schedules from day to day. On the whole, however, betterment is noted in takings of sheets as well as strip steel and of carbon as well as alloy steel bars, a mild stepping up in inquiries for bolts and nuts and even for manufacturing wire, long dormant, being noted.

Subsidence of the war scare in Europe brought a period of relative quiet and steadiness to non-ferrous metal markets. The export price for copper eased off to 9⅞ cents, permitting a fair volume of shipments abroad, but leaving the home market uninfluenced by the European state of affairs and producers' price for electrolytic unchanged at 10 cents. In the "outside" market copper was offered at around ⅛ cent below that level of 10 cents.

Tin turned rather dull. Spot Straits was freely offered at 41½ cents, at which level there was moderate covering by consumers on the first two days of the week. The Malay States government has under consideration a plan under which tin producers of that colony may temporarily add to their output, so as to ease the labor situation.

Reductions of from ¼ to ½ a cent per pound in the price of certain grades of No. 12 alloy have been announced by Middle West secondary aluminum producers. The market for virgin aluminum and its alloys is unchanged.

Reports from Mexico that the government of that republic might expropriate foreign-owned mines had no effect on the lead market. Demand for that metal is mostly of the carload variety. Prices are unchanged and steady.

No changes are noted in the price of zinc.—W. C. H.

Seventh Management Congress to Open in Washington Sept. 19

Announcement has been made that the Seventh International Management Congress will be held in Washington beginning Sept. 19. A number of papers prepared by men active in the automotive field are slated for the program which has yet to be completed.

Among these papers definitely scheduled for presentation are the following: "Decentralizing the Operating Organization"; "Executive Compensation and Incentive in the Business World"; Basic Factors Governing the Effective Coordination of Manufacture"; "Decentralization of Industry"; "Recent Developments in Manufacturing Plant Layout"; "Planning the Process and Equipment for Manufacture and the Budgeting for Equipment Replacement."

There will also be many papers contributed by leading authorities from other industries. Some of these are as follows: "The Concern of Business in Public Affairs"; "The Control of Business Through an Integrated Corporate Budget"; "Criteria for the Financial Control of Business Enterprise"; "Maintaining a Responsive Office Staff"; "Organization for the Control of Manufacture"; and "Objectives of Standard Costs and Their Use in Measuring Performance."

Dr. Karl T. Compton, president of Massachusetts Institute of Technology, will speak on "The Influence of Technical Progress Upon Social Development"; and Ralph E. Flanders, president of the Jones & Lamson Machine Co. and past president of the American Society of Mechanical Engineers, is to present a paper entitled "The Balancing of Incentive and Security." At one of the public sessions, there will be a three-way symposium among a prominent labor leader, a large employer, and a representative of the general public, on "A Common Ground for Labor and Management."

Letters to Automotive Industries

Editor, Automotive Industries:

Is it possible for me to obtain a copy of Automotive Industries for June 22, 1935, . . . time surely passes quickly, as, in about a month, I will renew my subscription to this indispensable journal for the thirty-first or thirty-second year.

V. W. Hewlett,
Radial Engines, Inc.

We cannot recall any subscriber whose interest in A.I. and its ancestors antedates Mr. Hewlett s. Do you have a prior claim?

Editor, Automotive Industries:

Your "Just Among Ourselves" item of Feb. 19 on Consumers Research Valentine brings to mind your earlier suggestion for contributions from factory-connected readers as to how much influence C R's opinions have had on the sale of their prouct. . . .

Judging from C R's latest opinions on automobiles, we opine that some manufacturer who will incorporate extensible bumpers, which may be drawn in when parking or garaging the car, might win C R's accolade, and also earn the right to advertise truthfully, "The Longest Over-All Length At Any Price." . . . Elementary considerations of weight distribution, pitching, road visibility, parking and maneuvering should reveal to C R the obvious objections to undue over-hang. Fortunately, the trend toward undue over-all length has been reversed by some manufacturers. . . .

Some interesting speculations were aroused by the rating of one of the low priced stripped cars which we will designate as X, charged with two major deficiencies, as first choice in that group for the moderate careful driver. The next car in that group, here designed Y, is not charged with any major deficiency, and is rated first choice for the hard driver, and the owner who tours, and drives hard and fast. From the scanty data shown it appears that over-all length was the factor that made car X suited for the moderate careful driver, although the actual wheelbase length alloted for passenger space was 7 in. less than that of car Y. In the discussion aroused by these gems of consistency, it was brought out that the regular equipment of trunk, ventilating system, bumper guards, dual horns, headlight beam indicator, cigar lighter, and extra interior light of car Y, if provided on car X would bring that job well into the next higher price group. Incidentally, C R stretched the over-all length of car X, and did not mention that its sale was not pushed, and that the advertising pamphlets of that

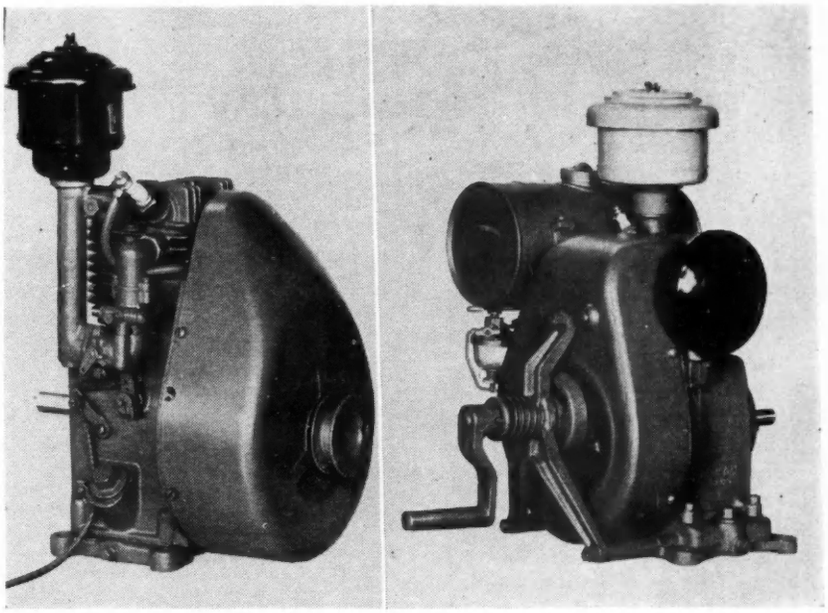
brand do not even mention the stripped job.

C R's vulnerability to advertising blah is revealed in their comment that a newcomer is even larger than the "big three." A check of the essential dimensions shows that the new engine uses about the same length of wheelbase as one, one inch more than another, and approximately 8 in. more than the largest of the so-called Big Three, which also excels by two or more inches in floor to ceiling height, as also in the essential door entrance height. Only in width does the newcomer excel by a very small margin. This brought forth discussion as to methods of rating relative size. An obvious and simple gage of car size that avoids tricky deceits often practiced to mask deficiencies is the measurement of passenger space fore and aft, floor to ceiling, and width at seated elbow height. By determining the length of wheelbase used by the engine, simple subtraction from the wheelbase reveals the desirable space alloted the passengers, and avoids the camoflage of cheaply extended over-all length, and seats over or behind the rear axle. . . .

These criticisms are not intended to imply that C R's recommendations are wholly without value to the consumer, but rather that the consumer must weigh them with care and supplement them with more reliable data. Perhaps we expect too much of them. Their off-shoot, Consumers' Union, appears to be infected by the same type of idiosyncrasies. Manufacturers' claims taken too literally appears to account for some of C R's lapses. One manufacturer claims that his '38 model is the best he has built—as though he expected the public to suspect degradation with the advance of the years. His advertising literature for his 112 in. wheelbase car include cuts which scale a wheelbase of 105 in. It has been suggested that an infiltration of agents of some of the notorious Service or Detective Organizations revealed by Senate Investigations may account for this manufacturer's type of advertising and sales methods. Another maker, also with a 112-in. job, claims the only perfected this and that, and quite consistently for several years has shown most attractive illustrations of a long sleek car scaling 134 in. of wheelbase with a low hung floor which it actually lacks by some 4 in. Although this brand dates back to 1914, the ads tally not 23 or 24 birthdays, but 27. Stranger still, the other brand dating to 1903, or even 1892, as such dates are generallyy figured by the prestige builders, does not claim 46 years or 35 years even, but recent ads refer to 30 years of experience.

On the whole, we have enjoyed reading some of the inconsistencies of Consumers Research. One engineer has suggested that C R's staff perhaps has been indulging in Professor Rhines Extra Sensory Perception Tests, and, in consequence, mis-stacked their cards. Possibly some of your readers may be encouraged to contribute their opinion as to the value of C R's recommendations on automobiles.

F. G. CLARKE.



SMALL SIZE Three new air-cooled engines of ½ hp., ¾ hp. and 1 hp. sizes have just been announced by the Lauson Co., New Holstein, Wis. The four-cycle 1 hp. model is compact, light weight, and incorporates the latest advances in cooling and ball bearing design. The horsepower developed by this engine is said to exceed 1.4. The ½ hp. and ¾ hp. models have dust-sealed magnetos, screen in fly-wheel housing, and oil bath air cleaners. Above at the left is shown the ½ hp. and ¾ hp. model, and at the right the Lauson Co.'s 1-hp. engine is pictured.

Labor

(*Continued from page* 431)

NLRB would require several weeks to make an investigation, conduct a hearing and follow other routine procedure so that an election, if held, is not expected immediately.

Members of the Hudson local have voted to continue their present curtailed week schedule rather than give longer weeks to some workers at the expense of others who would have to be laid off, as has been done in several other plants.

Homer Martin, UAW president, was attacked this week by General Motors Local No. 216, Los Angeles, which adopted a resolution asking the executive board to start machinery for a special convention "to remove Martin and all his gang." The union's procedure for calling such a special convention is so involved and complicated, however, and the cost of holding such a convention would make such serious inroads on the union treasury in its current state that there is felt to be little likelihood of the movement's being carried through.

"Unity" forces within the union have been combating Martin and have been conducting an aggressive campaign against his administratration. Some 200 members from locals throughout the country attended a "unity" caucus in Detroit on March 19, a closed meeting at which the "general situation in the union" was said to be discussed, but no connection was seen between this meeting and the action of the Los Angeles local.

Protests McFarlane Patent Licensing Bill

H. T. Bradner, of the Lees-Bradner Co., Cleveland, manufacturer of gear cutters, told a House Patent sub-committee on Monday that the McFarlane bill, requiring mandatory licensing of patents when a patentee fails to develop his patent within three years, would be a severe blow to his company and that he was "unalterably opposed" to the measure.

Mr. Bradner protested on the grounds that the proposal would upset existing law and throw open to companies financially able to supply the market plans which small concerns had spent years in developing.

Representative McFarlane, Democrat, of Texas, author of the bill, earlier in the session characterized his proposal as an anti-monopoly measure designed to prohibit the withholding of patents. Mr. Bradner took objection to the claim, pointing out that "ostensibly it's a help to small businesses but actually it's a boon to the big fellow."

Casing Shipments Down 5.6%

Shipments of pneumatic casings during the month of February, 1938, estimated at 2,348,949 units, show a decrease of 5.6 per cent under shipments made in January and were 46.3 per cent under shipments for February, 1937, when they were exceptionally large for that period of the year because of the general tendency toward heavy buying in anticipation of rising prices according to statistics released by The Rubber Manufacturers Association, Inc.

The association estimates production of pneumatic casings during February at 2,211,689 units. This is a decrease of 19.4 per cent under January and 57.8 per cent under February, 1937.

TOOLS OF TOMORROW

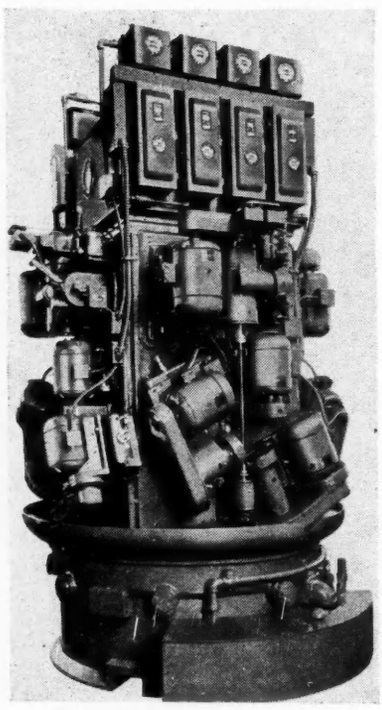
Shaving Metal Surfaces

. . . Machine operates on same principle used for shaving gear tooth surfaces

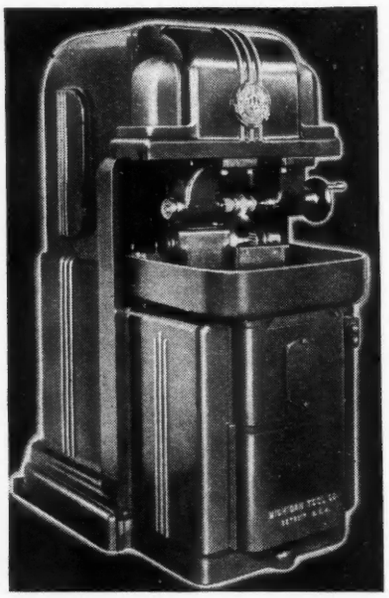
The shaving machine illustrated herewith, a product of the National Broach and Machine Co., is 16 ft. high, fully automatic, and rotates continuously.

The table, or base of the machine is stationary. The rectangular column above this base rotates about a vertical axis at a speed of one revolution every 28 sec. Each panel of this rectangular column accommodates one work unit. The principal operating elements are located on the outside surface of the machine where they are easily accessible for adjustment and maintenance.

Each column panel carries three spindles, one to rotate the work unit and two for the shaving cutters. One cutter shaves a cylindrical hub bearing, the second shaves a flat bearing face. Both operate simultaneously as the work unit rotates. Cutters are circular and beveled with a tooth form similar to that of a broach. The cutters are moved into position by cam action against the rotating work unit, thus no sudden load is thrown on the tool. Cutters are made of NA-LOY steel, approximately 7 in. in diameter with teeth having approximately ⅛ pitch. Material as hard as 38 Rockwell can be cut.



National Broach shaving machine



No. 860 Michigan gear finisher

Each column panel carries its own forced feed lubrication system. Coolant is under automatic control, flowing only while cutting is actually in progress. When each panel approaches the unloading position, coolant supply is cut off.

It is not necessary that all panels be operated, as each panel operates as an independent machine. The starting of these panels depends entirely on the action of the clamping handle. If the operator fails to load one panel, this unit will not operate.

"Low Cost" Gear Finisher

. . . Michigan introduces small model of single rotary cutter type

Michigan Tool Co. has announced a new low-cost gear finisher, the No. 860. The machine is the single rotary cutter type and operates on the same basic cross-axis principle which is incorporated into the company's rack type finishers. Cutter and gear rotate in mesh on the No. 860, but about different axes, so that as they rotate there is a sliding action diagonally across the face of the gear tooth. Serrations in the cutter teeth faces (on both sides of the cutter teeth) "shave" off excess material as the result of this motion.

The No. 860 is available in two types, the 8-in. and the 12-in., the designation referring to maximum gear diameters which may be finished on the two types. Adjustment of table travel feed is by change gears, while distance of travel of the table is adjustable by means of electric controls for the automatic cycle.

Farm Tractors in England

The output of farm tractors in Great Britain is recorded in the Census of Production under the Motor Industry. From this it appears that there has been a very substantial increase in production in recent years. Output in 1930 totaled 521 tractors, valued at £279,000 ($1,395,000) to approximately 8050 tractors, valued at £900,000 ($4,500,000) in 1935. This increase, and also the very marked fall in the average price, has been largely due to the transference of the Fordson factory from Cork to Dagenham, which was begun in 1931 and completed in 1934. The company operates a model farm in Essex, with the object of popularizing mechanized farming, and it has been estimated that well over half the total sales of British-made tractors are accounted for by this firm. Among other British manufacturers, Ferguson, Brown, Ltd., represent a new company formed during 1937 as a combination of the interests of David Brown Tractors, Ltd., and Harry Fergusin, Ltd. The company owns a factory at Huddersfield.

The total number of agricultural tractors in use is probably of the order of 60,000, while current sales, including both home production and imports, cannot be less than 15,000 per annum. The only figures available regarding the number of tractors in use are those for registrations of tractors subject to the annual tax of 5s. ($1.25), but such registration is only necessary where the tractor uses the public roads and the registration figures probably represent considerably less than half the total number of tractors in use. Last year, on the basis of figures given at the Second Oxford Conference of Mechanized Farming, it was estimated that the number of tractors in use in January 1937 was between 40,000 and 50,000—*Engineering*, March 4.

Peugeot's "Ideal" Car

French Firm's Latest Design Result of Public Survey

A new small car, not unlike the small Fiat in outward appearance, was shown the Paris public for the first time a few days ago by the Peugeot Automobile Co. In publicity issued to herald the advent of the new production it is asserted that it embodies the ideas of 260,000 Frenchmen regarding the ideal car. It appears that a buyers' survey was made by the firm, and that the above number of replies were received.

The new Peugeot 202 has a four-cylinder valve-in-head engine of 2.68 in. bore by 3.07 in. stroke, which gives it a displacement of 69 cu. in. With a compression ratio of 7, this engine develops 31 hp. at 4000 r.p.m. It has an aluminum cylinder head and wet cylinder liners. The crankshaft is supported in three main bearings, of 1.58, 1.74, and 1.78 in. diameter (front to rear, respectively). Crankpins have a diameter of 1.66 in. The aluminum pistons carry four rings each. Belt drive is used for the water pump and generator. The Solex downdraft carburetor is supplied with fuel from a rear-mounted tank. The fuel consumption is given as 7 liters per 100 km., which is equivalent to 34 miles per U. S. gallon.

The transmission is of the synchronized type, with three forward speeds. Final drive is by an underslung worm, with a ratio of 5.75 to 1. Front suspension is by wishbones mounted on torsion bars, while the rear suspension is on quarter-elliptic springs. The frame has box-section members and the engine is flexibly mounted upon it. The four-door body is of the Budd all-steel type.

The wheelbase is 96 in. and the track 40 in. The maximum speed is given as 64 m.p.h. The car weighs 1760 lb. and lists at 19,800 francs in the standard, and at 21,400 francs in the deluxe type ($585 and $655, respectively, at current rates of exchange).

260,000 Frenchmen influenced the design of this latest model Peugeot when they replied to the company's questionnaire asking for the French motorists' conception of the ideal car. A description of the technical features of the new model 202 will be found on this page.

Acme Photo

U. K. Tire Exports First

The United States ran second to the United Kingdom in total tire exports in 1937. American exports amounted to 1,250,722 pneumatic casings compared with 1,376,304 for the United Kingdom. Canada exported 862,928 tires, France 474,445 and Germany 250,524. The bulk of exports from Canada were from tire plants owned and controlled by American capital, American manufacturers having established Canadian subsidiaries years ago so as to take advantage of Canada's reciprocal tariffs.

British India was the United Kingdom's largest customer taking 220,980 tires. Denmark was second with 163,789. The Philippine Islands took 139,103 American made tires and Sweden took 75,915. Canada's largest customer was New Zealand which took 168,715 tires.

Opel Increases Exports

The Adam Opel Co., German General Motors subsidiary, increased its exports of cars from 15,705 in 1936 to 32,611 in 1937, an increase of 107 per cent.

Calendar of Coming Events

Conventions and Meetings

SAE National Passenger Car Meeting Detroit ..... March 28-30
Midwest Power Conference, Sponsored by Armour Institute of Technology, Chicago, April 13-15
SAE National Tractor Meeting, Milwaukee, Wis. .. April 14-15
Greater New York Safety Council, Inc., Ninth Annual Convention, New York City, April 19-21
Chamber of Commerce Meeting, Washington ..... May 2 to 5
American Foundrymen's Association, Foundry Show, Cleveland ..... May 14-19
National Battery Manufacturers' Association, Spring Convention, Cleveland ..... May 24-25
SAE Summer Meeting, White Sulphur Springs, W. Va., June 12-17

John Wing Prentiss

John Wing Prentiss, investment banking specialist, who three times offered Henry Ford $1,000,000,000 for his properties, died at his home in New York last week. Mr. Prentiss was a senior partner in the Stock Exchange firm of Hornblower & Weeks and made his first attempt to buy the Ford holdings in 1916 for $500,000.000. In testifying before the Board of Tax Appeals in Washington in February, 1927, Mr. Prentiss told of Henry Ford's reaction to his proposal and said that Mr. Ford "threw back his head and laughed, and wouldn't even consider it." Mr. Ford also refused to consider subsequent purchase offers of $1,000,000,000 extended by Mr. Prentiss in 1924, 1925, and 1927.

Among other financial activities of his career Mr. Prentiss handled for his firm the financing for Dodge, Chevrolet, General Motors and Hudson Motors.

Japanese Confer on Production Of Substitutes for Materials

The Japanese Secretary of Commerce recently called a conference of leading industrialists and government delegates with a view of studying methods of promoting the production of substitutes for raw materials that are now being imported.

It was decided to push particularly the production of artificial textile fibers of cellulose base, to take the place of wool and cotton; the regeneration of old rubber; the production of ammonium nitrate (for use in place of the sulfate, with a view to restricting the imports of sulfur); the substitution of aluminum for copper; the production of artificial leathers; and the tanning of fish hides.

Chancellor Adolf Hitler, inspecting an honor company of motorcycle riflemen, lined up in front of the Exhibition Hall in Berlin, during ceremonies in which Hitler opened the International Automobile and Motorcycle Show of 1938

Economy of Materials and use of Substitutes Marked at the

Berlin Automobile

By EDWIN P. A. HEINZE

IN 1937 the German automobile industry produced 264,441 passenger cars, 60,384 trucks and light delivery vehicles, 3442 buses, 14,237 three-wheeled light parcel carriers, and 149,423 motorcycles. All these are record figures for Germany. In the meantime, more than 2000 kilometers of the new super highways have been completed; a further 1500 km. are being built, and another 2000 km. have been laid out.

German design during the past year has been strongly influenced by two factors, viz., motor highways, and the very active development of new materials of domestic origin, for use in manufacturing generally, but particularly in the production of motor vehicles. Immense sums have been invested, and great progress has been made in the manufacture of synthetic rubber (called buna in Germany) and in the various processes for producing fuel and lubricating oil from coal, lignite and peat. Large factories for the production of these materials are rising in various parts of the country, and already the need for imported materials has been considerably reduced.

Great efforts are being made also to reduce the need for materials that cannot well be replaced with-

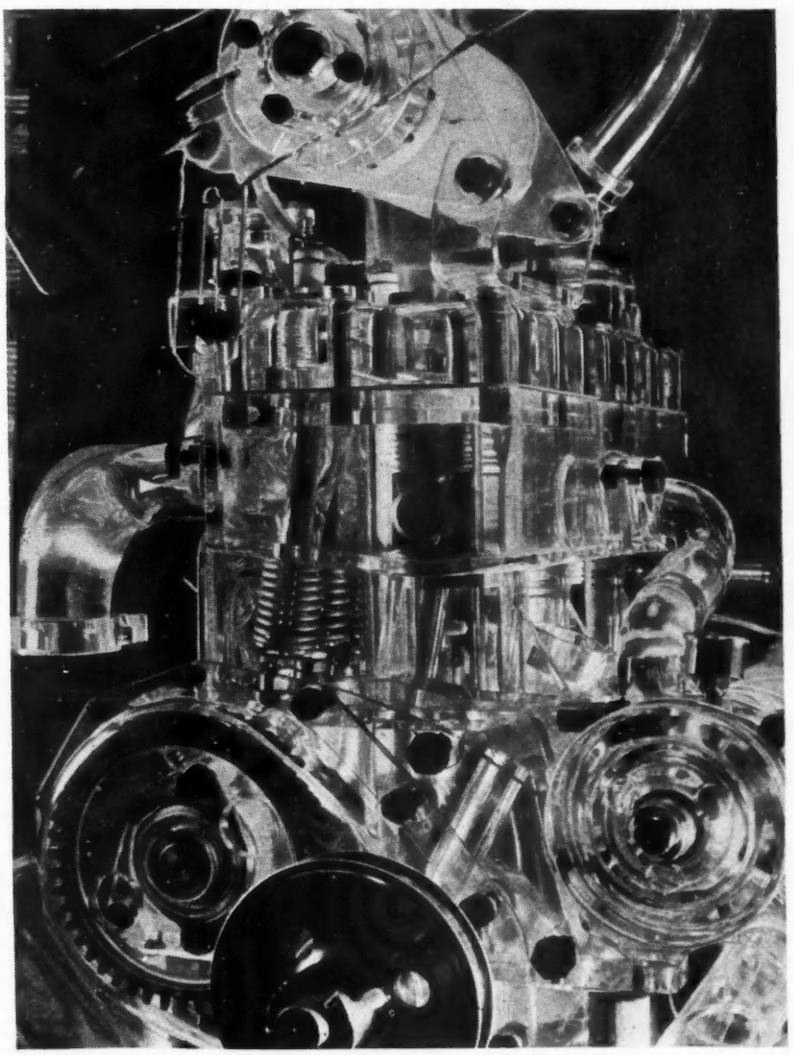
Acme Photo

light metals. New processes are being evolved for the production of aluminum from the rather poor German bauxites, and of magnesium from the plentiful German sources of magnesium chloride, magnesite, and dolomite. For such parts as door handles, radiator grilles, and decorative moldings, magnesium or zinc alloys, especially the former, are now being employed exclusively. The pressure die casting processes are being improved constantly, and the plants are being enlarged. In this way copper and brass are being saved, as well as nickel and chromium, as the substitute materials assume a fine polish, eliminating the need for chromium plating, which is disappearing, even on headlight shells. Some headlamps at the show had a rather attractive translucent cellulose finish that is said to withstand wear excellently.

Fuel pipes are now made of steel tubing, copper-plated, which while somewhat more expensive than the copper tubing formerly used, are much stronger and save considerable amounts of copper. Wherever possible, tubes of flexible synthetic materials are used, as for instance, for the connections of hydraulic brake systems.

The use of plastic materials is

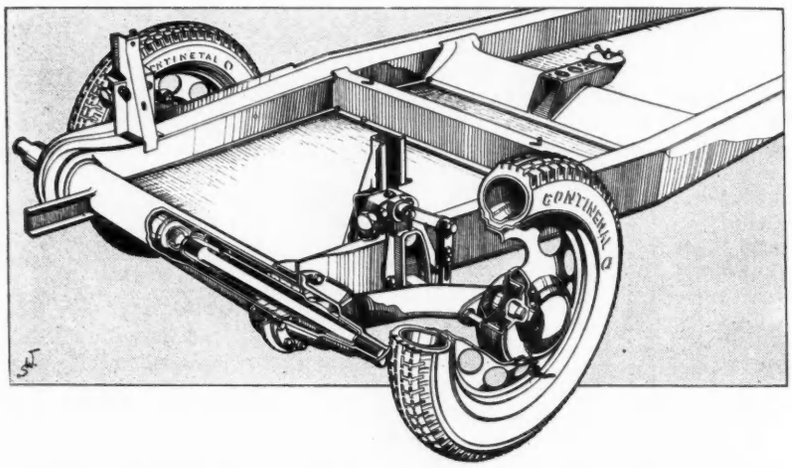
Engine with a block of transparent plastic material with inserted bronze strips on which the pistons run. Exhibited by Baur & Schaurte to illustrate advantages of heat-treated screws in engine construction



out impairing the quality of the finished products. Thus, in the Opel Cadet and Olympia models, for instance, by locating batteries under the hood, instead of under the seats, no less than 50 tons of copper will be saved in 1938, while the unit construction of body and frame of these same models during 1937 effected a saving of 10,000 tons of steel.

German makers have largely replaced nickel steels by chrome-molybdenum steels, thereby saving thousands of tons of nickel. The more complicated heat treatment required by the molybdenum steels is being mastered. Everything is being done to encourage the use of

e Show



Details of Adler Trumpf Junior torsion-bar rear suspension

increasing. It is replacing bronze as bearing material in certain parts, as, for instance, in steering heads. Big presses are said to be under development for the production of complete bodies of plastic material. At the Berlin show there was a stand illustrating various uses of plastics in motor vehicles, and among the exhibits on that stand were doors made of plastics, which require no color treatment.

Progress is being made also in the production of artificial leathers for upholstery. The latest products are said to be entirely non-odorous and water, fuel, and oil-proof. Research work has led to the development of upholstery materials containing mixtures of wool and cotton with synthetic wool, which are said to wear as well as, and in some cases better than, pure wool and cotton materials.

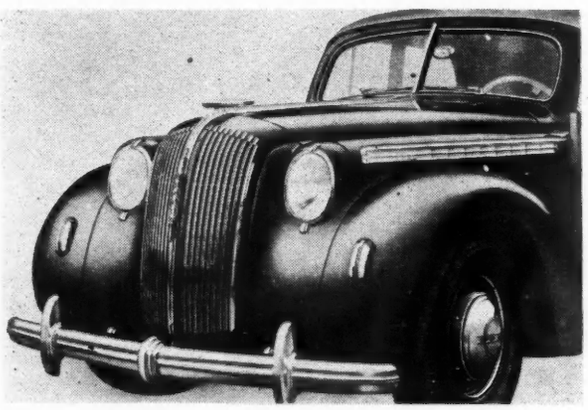
Development on bearing metals is still in progress. Although good results are said to have been obtained with aluminum, this material has not yet come into wide use. On the other hand, lead-graphite bearings are being used in many stock passenger car engines. In the case of highly stressed engines, such as Diesel, aircraft, sports and racing engines, lead-bronze (copper-lead) is being employed, and this is the bearing material used in the engines of the experimental lot of the proposed "Volkswagen."

As is generally known, the Government encourages the exportation of German cars, and to meet any prejudice on the part of foreign buyers, cars for export frequently are provided with parts produced from the conventional materials.

In this connection it may be of interest to record that German automobile exports nearly doubled over 1936. In 1937 there were shipped 55,517 passenger cars and 578 buses, valued, respectively, at 69,019,000 and 3,283,000 German marks. In 1936 the number of exported passenger cars and buses combined was 30,040 and their value, 48,543,000 marks. Small cars with piston displacements up to 91 cu. in. made up the bulk of the exports.

The new four-lane, 60-ft. super highways permit of high speeds with safety, and German manufacturers, still reluctant to fit cars with big engines, were confronted with the problem of producing small engines capable of standing up under full load maintained for long periods at a time. Light alloy pistons are universally used, among others the autothermic type, which has been adopted by Opel and several other manufacturers.

On the ordinary public roads in Germany, nearly as good average speed can be made with the small as with the high-powered cars, as was conclusively demonstrated by the 2000-kilometer trials held in Germany a few years ago, which even favored the large car in that all other traffic was kept off the roads. The new motor highways, of course, constitute as yet only a small percentage of the entire road system. Nevertheless, there are indications of a tendency toward increased piston displacements. One reason for this is that one avenue toward higher specific outputs is barred to German manufacturers by the demand on the part of the government that all new cars shall run satisfactorily on 72-octane fuel, even though the fuel sold at filling stations now ranges around 78 octane, and the benzol-gasoline blends around 81. The latter generally costs 10 per cent more than the standard motor fuels, which contain 14 per cent alcohol, while there is now no alcohol in the benzol mixtures. For this reason it is impractical to use compression ratios higher than 6.2 to 6.4, unless further improvements in combustion-chamber design and cooling can be effected. This also tends to limit the permissible cylinder size, and is likely to put a stop to the reversion to four-cylinder engines, which began three years ago.



Front end of Opel Admiral model, with six-cylinder 220-cu. in. engine.

There is a marked tendency in Germany toward valve-in-head engines. For 1938 the German industry is offering 56 different chassis models (68 last year) with 42 different engines, of which 29 have the valves in the head. Opel introduced its first valve-in-head engine in the Super-6 model of 150 cu. in. piston displacement brought out last year. The rating is 55 b.hp. at 3600 r.p.m., which is only 0.366 hp.

per cu. in., and it is obvious that with a few modifications its output could be readily increased considerably if the motor highways and competition should make this expedient.

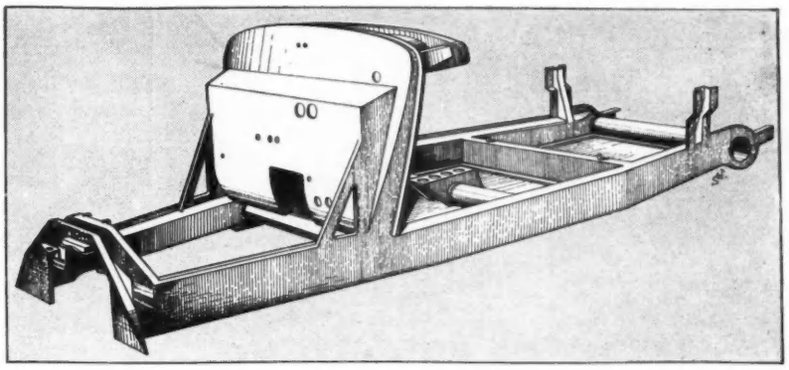
This year a corresponding four-cylinder model has been launched, but while it has the same bore as the Super-6 (3.15 in.), the stroke has been reduced from 3.23 to 3.07 in., to limit the displacement to 1.5 liters (91 cu. in.). The output is 37 hp. at 3400 r.p.m. This car competes with the 1.7-liter Mercedes-Benz, with a four-cylinder L-head engine of 38 b.hp. at 3200 r.p.m. In outward appearance and general layout the new model is practically identical with the former Olympia. The body is built integral with the frame. The hood is of the alligator type, and the headlamps are recessed in the front ends of barrel-like sides of the cowl. As on other Opel models, the Dubonnet system of front suspension is used.

The Admiral also was introduced last year, but has been placed in production only recently. It has a six-cylinder 3.54 by 3.74 in. (220 cu. in.) engine, and with a compression ratio of 6 is rated 75 hp. at 3200 r.p.m.

The new Olympia, the Super-6, and the Admiral are the three Opel valve-in-head models. Besides these, two older (Cadet) models are being built with the old four-cylinder L-head engine of 65.5 cu. in. displacement. One of these is a low-priced model with rigid front axle.

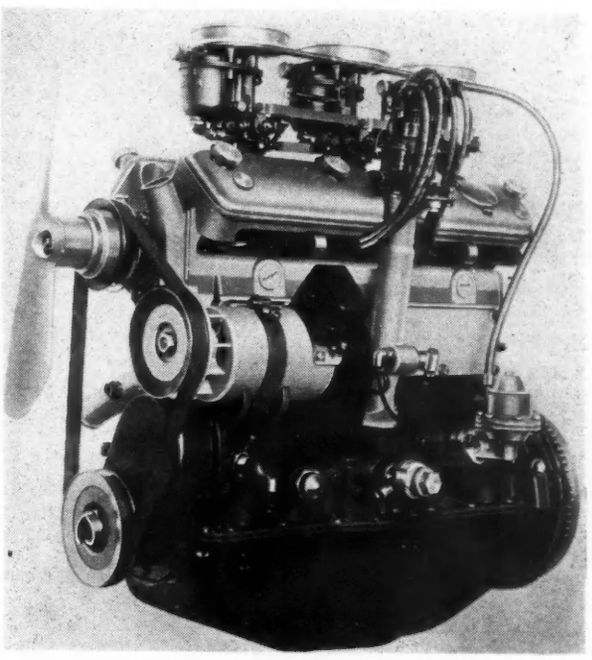
The three new valve-in-head Opel models have automatic heat control and a thermostat in the water-return pipe. The former feature has been adopted also by Mercedes-Benz this year.

For high-speed travel the Adler



Frame of Adler Trumpf, Junior, a car having independent suspension all around

firm has developed its six-cylinder 152-cu. in. model, which was introduced last year. This also is a chassis-less type and is rather elaborately equipped, having two carburetors that open progressively one after the other, hand-operated radiator shutters, a thermometer on the instrument board, and independent springing front and rear. Adler is one of the exponents of front-wheel drive, but not for engines of more than four cylinders. In one four-cylinder model the displacement has been increased from 103.5 to 122 cu. in., and the output from 38 to 45 hp. While the stock model of this car has a maximum speed of 68 m.p.h., the factory now also offers a two-seater sports sedan with a guaranteed speed of 94 m.p.h. This is a modified model of the 2½-liter type, fully streamlined, in which the engine output has been raised from 58 to 82 hp. Three carburetors are fitted, and the speed



B. M. W. six-cylinder 122-cu. in. sports engine (with three carburetors)

Adler six-cylinder 58-hp. sports sedan

has been raised to 4500 r.p.m. The specific output has thus been increased to 0.525 hp. per cu. in., which is probably close to the limit for an L-head engine.

Adler Works have eliminated the Primus and replaced the Trumpf by a new model of the same name but having an engine of 122 instead of 104 cu. in. The 61-cu. in. Trumpf Junior and the 183-cu. in. Diplomat are continued, the latter largely because it has a separate chassis and therefore can be fitted with bodies to suit any taste.

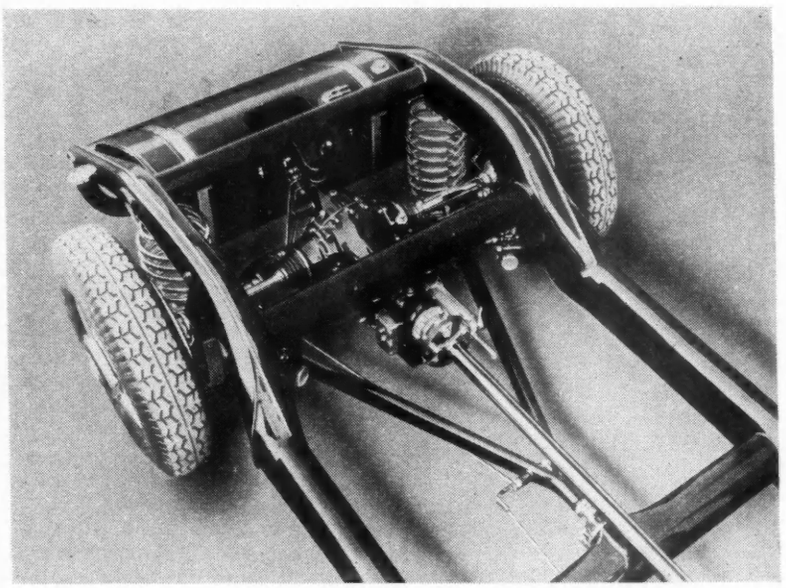
The Bayerische Motoren Werke (BMW) now build several body types integral with a box-type frame, equipped with a six-cylinder 122-cu. in engine. The latter is furnished optionally with one or the other of two different compression ratios, and also with either one or two carburetors. It delivers 45 hp. with a single carburetor and a compression ratio of 6; 50 hp. with two carburetors and a compression ratio of 6, and 55 hp. with two carburetors and a compression ratio of 6.3.

A special model introduced by BMW has a streamlined body of the Jaray type and can be had with either the standard 50-hp. engine or the 80-hp. sports engine. The four-speed transmission of this model incorporates an overdrive and a free-wheeling unit.

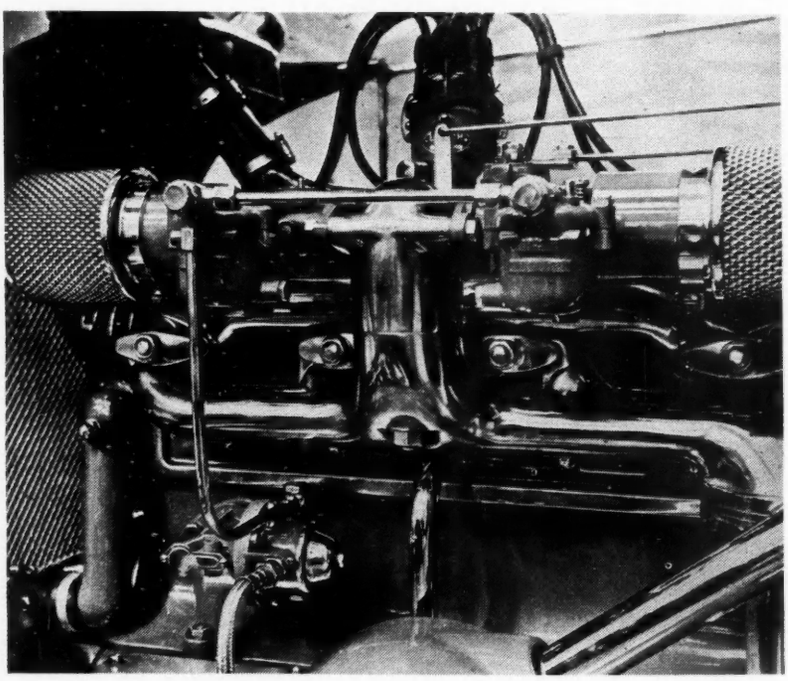
Mercedes-Benz have improved their models in detail. Their best seller is the "170 V" with four-cylinder, 103.5-cu. in. L-head engine. The engine has been improved by equipping it with automatic heat control and inserts for the exhaust-valve seats. Lubrication and enclosure of the front-wheel assembly have been improved. The clutch has been strengthened and fitted with a ball-thrust bearing.

Mention may be made here of the fact that according to new regulations, all new cars have to be fitted with safety glass in all transverse windows.

The Mercedes-Benz rear-engine model, which has the same 103.5-cu. in. engine as the model just referred to, now has a new fuel pump and manual heat control by means of a throttle valve in the circulation system. In manipulating this valve, the driver is guided by oil and water thermometers on the instrument board.



Rear end of chassis of the new Big Mercedes with independent rear suspension



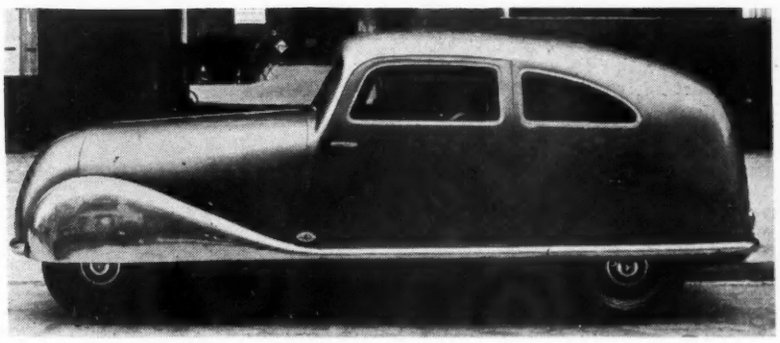
Adler six-cylinder 58 hp. engine with two cross-flow carburetors

The 140-cu. in. model has been improved by equipping it with larger tires and wider centri-cast brake drums. Most German cars are fitted with Lockheed brakes manufactured in Germany by Ate. Mercedes-Benz now has the latest type, with automatic take-up for wear of the brake lining. Double-acting hydraulic shock absorbers are fitted all around, and the hand brake now acts directly on the rear wheels instead of on the transmission. The former three-speed gearbox plus overdrive has been discarded in favor of a wholly synchronized four-speed gearbox.

On the "540" supercharged model, with an eight-cylinder, 292-cu. in. engine developing 180 hp. at 3400 r.p.m., the new Bosch ignition control, operated by the supercharger pressure, is standard equipment. Sodium-filled exhaust valves are now fitted. With certain body types this car is able to reach

maximum speed of 106 m.p.h.

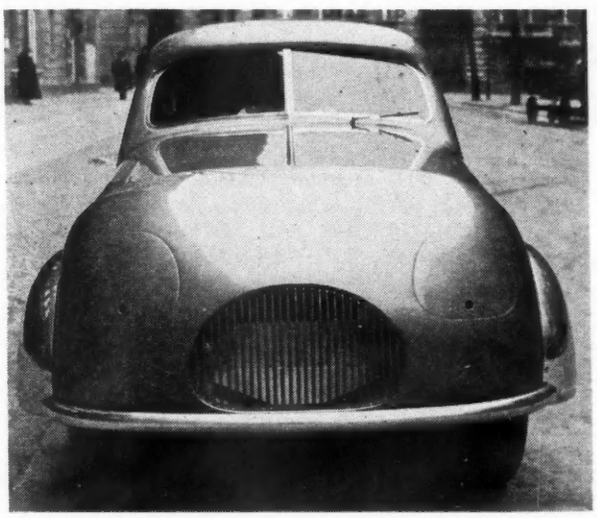
A new large Mercedes, seating eight persons, was the only entirely new design at the show. It has a wheelbase of 145, and a track of 60 in. Its electrically-welded, tubular frame has oval-section side rails. Its front wheels are independently suspended by means of coil springs and parallel links. The rear construction is of what is known in England as the DeDion type, comprising a tubular axle bowed toward the rear to accommodate the rubber-mounted, sprung, final-drive housing, from which the wheels are driven through jointed shafts. There are diagonal radius rods, and suspension is on two large coil springs located behind the axle. The engine is an eight-cylinder supercharged model of 470-cu. in. displacement, developing 230 hp. at 3000 r.p.m. A fully-synchronized four-speed gearbox is fitted, together with a Maybach over-drive on the differential.



Professor Everling's "cut-off" streamlined body (aluminum construction)

Auto-Union has confined itself to detail improvements. Its small DKW front-drive cars, which had the largest sales in Germany last year, have been slightly enlarged. Audi and Wanderer cars are continued unchanged, while Horch engine outputs have been slightly raised. All Horch cars now have independent front-wheel suspension.

Hansa now concentrates on three chassis models, all with valve-in-head engines. Stoewer has dropped the high-priced V-8 front-drive model. The 12-cylinder Maybach "Zeppelin" has a new seven-speed gearbox of the type which permits speed changing without declutching. Speeds are changed by means of a small lever on the steering column moving over a sector with positions numbered 1 to 7, through the intermediary of a vacuum cylinder. Only a small reversing lever now projects from the floor in the driver's compartment. The engine develops 200 hp. and permits of a speed of 100 m.p.h. with the conservative-type, seven-passenger sedan exhibited at Berlin. Whereas the Zeppelin model has rigid axles, the "SW 38," with its six-cylinder 232-cu. in., 140-hp. engine, has independent suspension all around. It has a vacuum-operated five-speed gearbox. An unusual feature of the engine is the use of leaf springs tapering in width, for the valves, which are said to prevent spring surge.

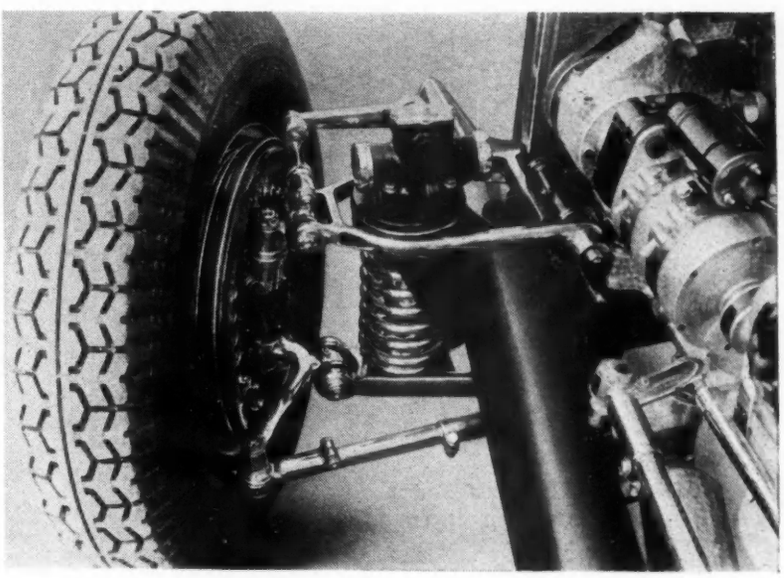


Front view of Professor Everling's body

Practically no changes were made in the German-built Ford V-8 and the Ford four-cylinder, except in the bodies. At present, not only the sedan but also the "cabrio-limousine" with its pull-back fabric top, is entirely made of steel.

The idea of doing away with a separate chassis frame is gaining ground, and three Adler, three

(*Turn to page* 457, *please*)



Front independent suspension of new Big Mercedes with panel-type frame of large oval tubes

Automotive Gear Design

Part 2

Part One appeared in the Nov. 27, 1937, issue of AUTOMOTIVE INDUSTRIES. *Part 3, concluding the treatise will appear in an early issue.*

By R. S. DRUMMOND*

IT is a matter of record that there are still many manufacturers, particularly among those not intimately associated with the large automotive transmission plants, who are not fully cognizant of the sweeping changes in gear steel specifications that have taken place in recent years.

On the one hand we have a relatively small group of manufacturers who, many years ago, anticipated the need for good gear steels and standardized upon some special and costly analyses and have continued this practice to this day; on the other hand, we find many who cling tenaciously to the idea that the best gear steel is the S.A.E. 1020 which is made in the open hearth furnace.

Over a period of years we have seen a steady progress from S.A.E. 1020 to 3100 Series S.A.E. steels, the latter, in turn, being replaced by the 2500 Series S.A.E. steel for carburized gears. In the interim there have been many special alloys featuring certain desirable qualities all of which have been tried and then have gone to the limbo of things.

Today the most popular alloys for gear steels are found in the family represented by the 4600 Series S.A.E. specifications. These steels are widely used for transmission and axle gears and offer the specific advantages of relatively low first cost due to the great tonnages in which they are produced, of susceptability to the right kind of heat treatment, and finally of very high physical properties and excellent wearing quality.

Among the large production transmission builders in the automotive industry there are two schools of thought when it comes to gear hardening. One important group prefers case carburizing—the other, surface cyaniding. Some commercial plants use both methods, depending upon the preferences of the customers.

Generally speaking, for carburized gears for transmissions and rear axles, the industry has standardized upon the S.A.E. 4620 analysis. Its chief alloying elements are nickel and molybdenum, while some users also specify a small percentage of chromium. This alloy can be made to exhibit an extremely hard surface and yet produce a very strong and tough core by means of a simple heat treatment which will be described later.

Now it should be thoroughly understood at this point that the selection of gear steels does not end with the specification of suitable chemical and physical properties. The matter is much more complex. In the first place, current metallurgical studies have proved that it is essential to specify a definite grain size for a given kind of application. In general, fine grain structure is preferred for gears, because of its superior hardening characteristics and ability to resist heat-treat distortion. Grain size is usually specified between 6 and 8 on the A.S.T.M. standard grain size chart.

This type of steel tends to be of abnormal structure, although, of course, not to any objectionable degree. However, it should be reasonably clean, and cleanliness should be specified so as to control abnormality and its effects.

Having established the basic alloy specification together with the supplementary control specifications mentioned above, the next step is to control the forging practice. Much of the trials and tribulations experienced in gear fabrication in recent years may be attributed directly to faulty forging practice, making it one of the fundamental controls in modern gear production.

Suffice it to say that in forging this type of alloy steel, you should take all the precautions required in handling other alloys. Bar stock should be sheared as evenly as possible and preferably sawed. In practice, most gear forgings are upset. They should be forged at a temperature of 2200 to 2250 deg. Fahr. and allowed to cool uniformly.

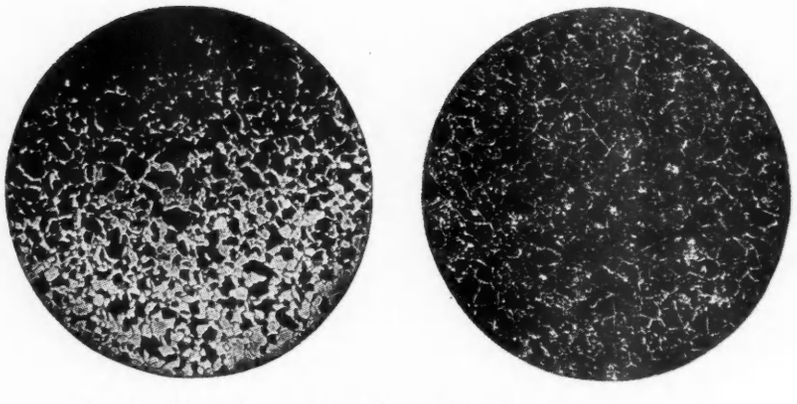


Fig. 1—Microphotographs illustrating the type of microstructure desired for modern transmission gears. This group covers the range from No. 6 to No. 8 on the standard grain-size chart, indicating both the hypereutectoid and eutectoid structures when carburized 8 hours at 1700 deg. Fahr. and cooled slowly.

* President, National Broach & Machine Co.

Demands Modern Methods

Rough Heat Treatment

Many different heat treatments are used after forging. Some manufacturers heat to 1700-1800 deg. Fahr. and cool in air. Some cool in the furnace to various temperatures and then cool in air.

One of the characteristics of steels of these alloys is that they pass through the critical range very slowly on cooling. While the critical points are normally from 1400 to 1200 deg. Fahr., on cooling they can be depressed as far as 800 deg. or lower. For instance, if the steel is normalized at 1800 deg. Fahr. and cooled very slowly, in the furnace, the lower critical point can be passed at 1200 deg. Fahr. On the other hand, if normalized at 1800 deg. Fahr., and cooled rapidly at 1200 deg. Fahr., or 1000 deg. Fahr., and then cooled slowly, the lower critical point can be made to occur as low as 800 deg. Fahr. or lower. If the steel is cooled down rapidly in air, it usually does not pass through the lower critical. In this case some of the austenitic and martensitic crystals do not have time to transform to pearlite, which is the desired structure for good machinability.

The matrix or main body of the crystalline structure is ferrite, which is soft (about 150 Brinell). If this matrix contains finely divided and equally distributed crystals of pearlite, it will Brinell 150-200, and good machinability is assured. But if the matrix contains a sprinkling of austenite or martensite crystals, which are very hard, one can easily see what will happen to the edge of a cutter which strikes them. They first knock off the cutting edge and then drag through the cut, leaving a torn and ragged surface, on the side of a gear tooth.

For this reason, different heat treaters have different normalizing cycles for this steel. Satisfactory results are obtained if sufficient time is allowed at some suitable range in the cooling cycle for the steel to pass through the critical range.

Regarding the high heat, this steel can be normalized as high as 1900 deg. Fahr. without objectionable grain growth. However, in normalizing to improve machinability and to prevent distortion in the subsequent hardening operations, it is only necessary to heat to 25 to 50 deg. above the carburizing temperature.

A normalizing cycle which has given good satisfaction is as follows: (It is done in a continuous furnace and was established after several series of tests.)

Heat to 1800 deg. Fahr. for ½ hr. to 1 hr. depending on size and number of forgings. Cool rapidly to 1000 deg. Fahr. (½ hr.). Cool at the rate of 100 deg. per hr. to 600 deg. Fahr. Cool in air.

The rapid cooling from 1800 deg. to 1000 deg. tends to minimize banding and increased hardness, while the slow cooling from 1000 deg. to

CHEMICAL COMPOSITIONS

SAE	CARBON	MAN.	P. MAX.	S. MAX.	Ni.	Mo.
4615	0.10-0.20	0.40-0.70	0.04	0.05	1.65-2.00	0.20-0.30
4620	0.15-0.25	0.40-0.70	0.04	0.05	1.65-2.00	0.20-0.30
4640	0.35-0.45	0.50-0.80	0.04	0.05	1.65-2.00	0.20-0.30

CRITICAL TEMPERATURES

	ON SLOW HEATING			ON SLOW COOLING		
SAE	AC-1	AC-2	AC-3	AR-3	AR-2	AR-1
4615	1335	1400	1485	1400	1320	1200
4620	1335	1400	1470	1390	1320	1175
4640	1320	1400	1430	1300	1320	1125

PHYSICAL PROPERTIES

CORE PROPERTIES OF 4615 CARBURIZED
TENSILE STRENGTH 145,000 TO 148,000 LBS. PER SQ. IN.
ELASTIC LIMIT 95,000 LBS. PER SQ. IN.
REDUCTION OF AREA ABOUT 45%
ELONGATION IN 2 INCHES 15%
BRINELL 285-290

4620 TESTED IN 0.520 ROUND
FORGED 2150 TO 2250 F. NORMALIZED 1700 F.
ANNEALED 1550 F. QUENCHED 1475 F. IN OIL
DRAWN 300 TO 400 F. FOR ONE HOUR
TENSILE STRENGTH 185,000 TO 195,000 LBS. PER SQ. IN.
YIELD POINT 150,000 TO 155,000 LBS. PER SQ. IN.
REDUCTION OF AREA ABOUT 45%
ELONGATION IN 2 INCHES ABOUT 10%
BRINELL 300 TO 315

4640 NORMALIZED AT 1650 TO 1700 F.
QUENCHED IN OIL FROM 1450 TO 1500 F.

	BRINELL	T. S.	Y. P.	R.A.	ELON.
ONE HOUR DRAW 800 F.	363	178,000	147,000	46%	10%
" " " 900 F.	321	158,000	130,000	48%	11%
" " " 1000 F.	293	142,000	115,000	51%	13%
" " " 1100 F.	262	128,000	104,000	55%	16%
" " " 1200 F.	241	119,000	94,000	58%	19%

Fig. 2—Chemical composition, physical properties and heat treatments of a group of new gear steels that have been adapted by leading transmission manufacturers.

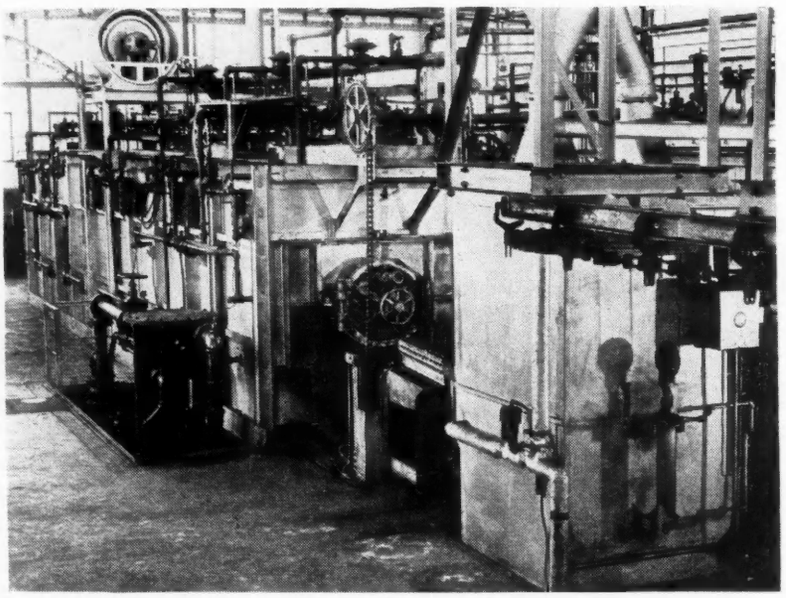


Fig. 3—New Holcraft gear-carburizing furnace

600 deg. Fahr. allows ample time for the micro constituents mentioned above to completely transform. A hardness of 150 to 200 Brinell is desirable, but not always obtained. Good machining always results at that hardness if there are no austenitic-martensitic crystals left. Otherwise, stop rapid cooling at a little higher temperature. Many times this steel is as soft as 140 Brinell after normalizing. This is too soft, and usually causes trouble in machining. To correct this, cool rapidly to a little lower temperature.

The gear forgings are then cleaned and machined by various methods, such as hobbing, shaping, milling, etc. Some are rough cut and finished on a special gear finisher, or so-called shaver. Some are burnished. Regardless of the method used, it is not advisable to take a real heavy cut, as this cold-works the metal on the tooth surface, increasing distortion of grains which when heat treated may cause trouble. Some large gears are given a normalize or high temper after the rough cutting.

Most S.A.E. 4620 steel gears are carburized to a depth of 0.035 to 0.070 in. and quenched in oil directly from the carburizing box. A case depth of 0.045 in. is usual practice for transmission gears. The larger rear-axle gears are given as much as 0.070 in., although 0.050 to 0.060 in. is the average value.

Most carburizing is done by packing the gears in a heat-resisting alloy box with a commercial carburizing compound (coke, charcoal and energizers). They are heated to the carburizing temperature for the required time around 1650 to 1750 deg. Fahr. The higher heats produce a deeper and richer case in the same time with the same compound, but cause more distortion when quenched direct. The amount and type of energizers (sodium, barium, and calcium carbonates) in the compound, govern the speed of carburizing at a given temperature. A recommended practice is as follows:

Carburize at 1675 deg. Fahr. (10 hr. for a case of 0.045 in.). Remove gears from box and quench in oil.

The oil should be at a temperature of 100 to 120 deg. Fahr. and flowing in the tank. A large flow but not much pressure is ideal. The size and shape of the gear should be considered in quenching. Some gears are quenched on a special fixture. Some gears with splined holes are quenched on a special plug made to hold the splined hole true. Nearly all gears are quenched with the axis of the gear vertical.

An excellent method of quenching is to have tubes or pipes placed in the oil tank, large enough to receive the gears to be quenched. They are equally spaced, the top level with the oil, and extend about 1 ft. below the

(*Turn to page* 459, *please*)

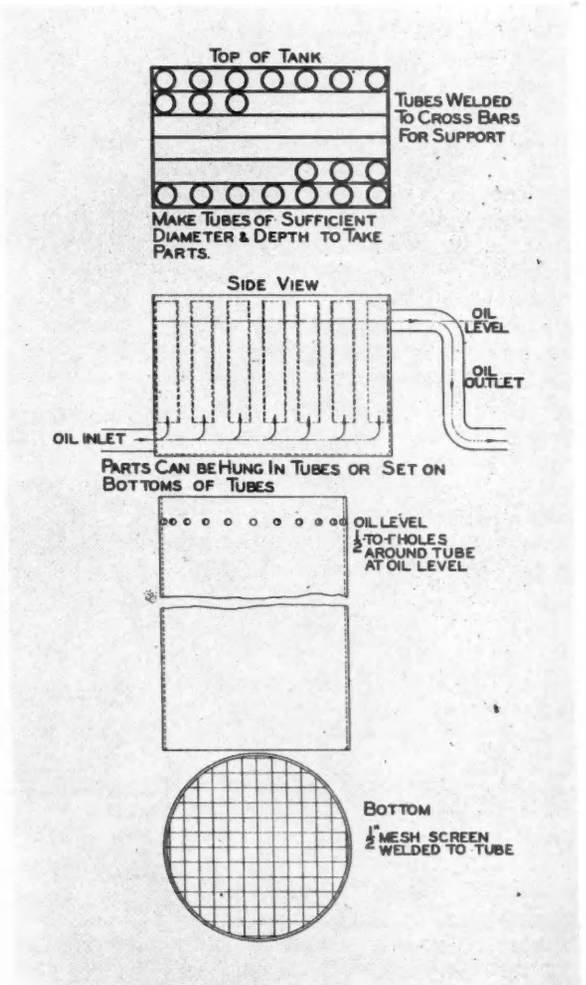


Fig. 4—This sketch shows an excellent method used by some gear plants for controlling the uniform quenching of transmission gears. Essentially, this method comprises the use of tubes or pipes of suitable diameter to accommodate the gears. Oil flows up through each individual tube and out through the overflow at the top of the tank.

Just Among Ourselves

How to Save an Automobile Company

As this is being written, unless a kindly fate should intervene, an auction is being held in Buffalo to dispose of tools with a market value of $200,000, in order to satisfy a creditor of the Pierce-Arrow Motor Car Co. The company emphasizes the fact that these tools are easily replaceable, and that their sale does not seriously affect the position of the company in the light of a possible reorganization.

At a hearing on March 10, the ugly word liquidation was mentioned in connection with the company's affairs by the attorney for the trustees, who said: "We expect to know within a month whether or not we will have to liquidate."

The possibility of Pierce-Arrow disappearing from the scene as an automobile manufacturer is something which arouses in us a dismay which is more than sentimental. It is a possibility, we believe, for which there is a solution. The proposed solution has been discussed neither with Pierce-Arrow officials, the trustees, nor with any of the other interests whose names are mentioned in connection with it. But to propose it, discuss it and the conditions which gave rise to it, can do no possible harm, and may throw a little light on some conditions in the industry which will have to be met in the future.

Centripetal forces are again at work in the automobile industry. During the last two years, Duesenberg, Auburn and Cord have disappeared from the market, Hupp has been in suspension, and several other independent manufacturers have had tough scrambling to keep their heads above water. It is common gossip among brokers that the end of this year may see one or two more demises in the independent field. All of the companies involved, over a period of years have very definitely contributed their share to developing competitively for the public the best individual transportation in the world.

No More

If from now on there is any significant reduction in the number of independent manufacturers in the field, we believe it will react adversely on the public's favorable view of the industry as a whole. It will have, naturally, no material effect on the number of cars sold, so long as they continue to be priced for the volume market, but it may produce in the long run hampering legislative restrictions on an industry which provides too few targets for its own health.

We know of one near-monopoly in the United States which consistently encourages small producers in its field in order to prevent itself from becoming a complete monopoly in the public eye; in order to provide its own staff with competition to bite upon.

There isn't much of a mass market for expensive automobiles, but there's enough of a market to make it desirable to preserve competition at this level, as well as on the volume level. A segment of the public complains bitterly that American cars are too

(*Turn to page* 459, *please*)

New Building of Wilcox-Rich Has

WHEN many prominent engineers attended the "open house" celebration at Wilcox-Rich Division of Eaton Mfg. Co., during the S.A.E. Annual Meeting in Detroit, they were treated to the first public showing of the new engineering building placed in service a few months ago.

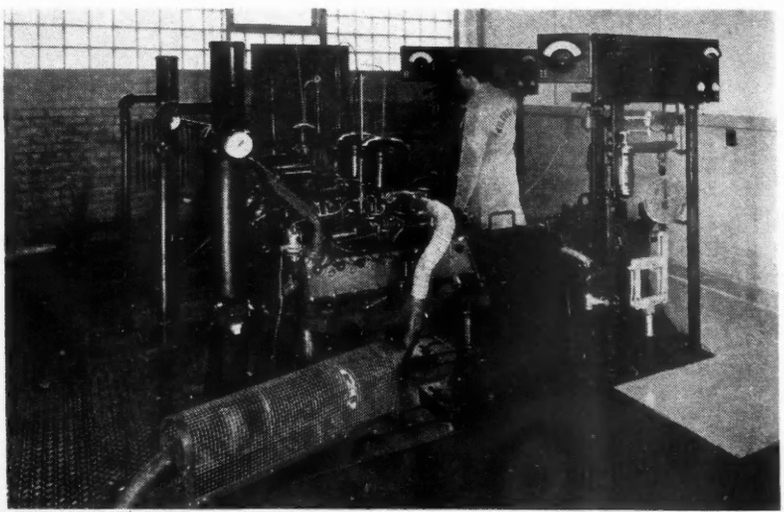
The modernistically styled exterior and handsomely appointed interior are but the framework of an unusual set-up designed to facilitate the dynamic program of engine research undertaken by Wilcox-Rich.

The building proper is of modern design with a curved front and generous glass brick areas to promote better seeing. Two stories in height, it has an area of 120 x 30 ft. The upper floor contains the offices for the chief engineer and research staff, an excellent drafting room, and several rooms containing facilities for metallurgical and metallographic studies.

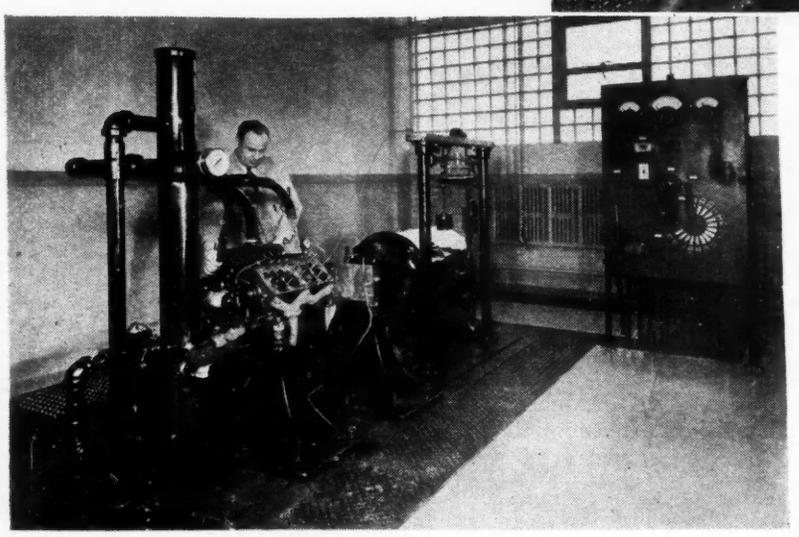
By far the most interesting feature of the new plant is the group of four dynamometer rooms on the lower floor. Each room is an independent unit with its own equipment and instrumentation, and may be completely sealed from its surroundings by locking a heavy insulated door. Ceiling and hanging ceiling in each dynamometer room are treated with special acoustic materials to absorb sound.

To promote comfortable working conditions, each room is provided with a conditioned atmosphere by frequent changes of air from a built-in ventilating system which brings in fresh air under pressure from a duct near the ceiling, forcing the spent air to exhaust through a grid in the floor. In addition to the main ventilating system, there is a separate exhaust system in a floor tunnel which carries away the engine exhaust.

The first dynamometer room contains two dynamometer beds, each fitted with the new Mid-West induction absorption machines rated 175-200 hp. at 4000-6000 r.p.m. These machines do a remarkable job wherever a straight power absorption device is required. One of the test set-ups is a 1937, 85 hp. Ford V-8 engine rigged up for an endurance test on valves. The second machine is fitted with a new Cadillac V-16 engine which is being run to check on hydraulic valve lifter performance in a production engine.



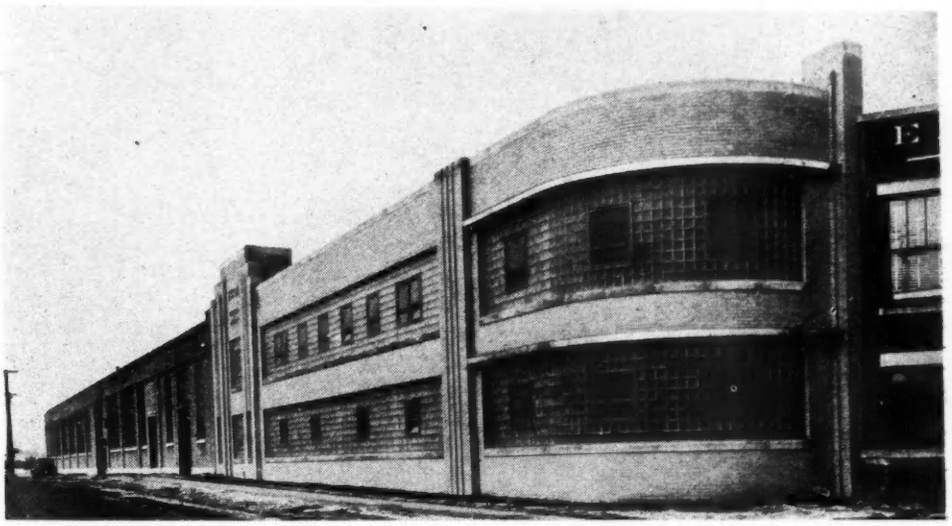
Cadillac V-16 production engine on test coupled to Mid-West Induction absorption machine rated 175-200 hp. at 4000-6000 r.p.m. Purpose of this test is to check on performance of hydraulic valve lifters. Cylindrical stack at forward end of dynamometer bed is cooling water supply, thermostatically controlled. Note— second Mid-West machine in background near outer wall.



Ford V-8, 85 hp. engine undergoing special accelerated valve life tests on this electric dynamometer set-up.

The second dynamometer room contains a 150 hp. 4500 r.p.m. Sprague electric machine. At the present time tests are being conducted on a Continental D2-6202

Set-up for Broad Dynamic Program



Exterior view of new engineering and research building shows modernistic styling and use of glass brick construction.

tractor engine. A test set-up and instrumentation are designed to provide measurements of valve stem expansion under operating conditions by means of a special Stroborometer.

The third dynamometer room contains a 150 hp. 3500 r.p.m. Sprague electric machine. Here the present set-up is an endurance test of valve seat inserts on a standard P-6 Plymouth engine.

The fourth dynamometer room is provided with the latest type G.E. electric equipment with a speed range of 5000-6000 r.p.m. It is rated 200 hp. as a power absorption device and 150 hp. as a motor. The present set-up is a test for hydraulic valve lifter performance, on another of the engines featuring this device in current production. The engine under test is a new 12-cylinder White pancake engine.

In addition to the dynamometer rooms there is a large laboratory containing demonstration equipment and provided with what might be termed static testing devices on valves, lifters, inserts, etc.

Good housekeeping is the keynote of the entire plant and this has been effected rather skillfully by providing garage facilities and a work shop in a separate section at the extreme end of the building on the lower floor. Here will be found storage facilities for the cars, special storage bins for test engines, and a small experimental machine shop.

Adjacent to this garage department is an enclosed and soundproofed room which is used for conducting various destructive tests on valves, inserts, etc. Noise, extreme heat and other effects attending such tests are effectively kept out of the laboratory proper.

Corner of metallurgical laboratory on second floor. In the foreground, two pieces of new equipment—a Rockwell hardness machine, and the new Bausch & Lomb binocular microscope.

Frameless Chassis Are Feasible with New Process

Hart resistance welding applied to mass production. May prove of value to bus and truck field

FOLLOWING a number of years of development and experimentation, Steel and Tubes, Inc., Cleveland, Ohio, a subsidiary of Republic Steel Corp., announces the Hart process of resistance welding of tubular joints, covered by U. S. patent No. 209,982, and other patents pending, exclusive rights for which are owned by Steel and Tubes.

The availability of this mechanized process is said to make it feasible to place on an economical production basis the fabrication of complete tubular structures for frameless bus and truck chassis. The following description shows how the Hart process has been applied on a mass-production basis.

The first electric resistance welding production line, comprising five welders, has just been installed by the Cleveland Welding Co., of Cleveland. This company specializes in automotive and high production items.

The Hart process consists essentially of three major steps:

Reinforcing the tube ends.

Preparing the tube ends for welding.

Welding.

To obtain the maximum strength with light gage tubes, it is necessary to reinforce the ends of the tubes to provide greater wall thickness for the welds. If the tubing has a comparatively heavy wall, or if the maximum strength is not necessary, reinforcing is not required. Reinforcing is done by expanding the end of the tube slightly for a distance of 1 in. or 1½ in. by means of a punch. Into this expanded end a reinforcement is placed, after which the tube is pressed through a die, drawing the end of the tube down over the knurled reinforcement to the original diameter in such a way that the points of the knurl are firmly imbedded in the inner wall of the tube. This reinforcement provides a heavier wall at the end for welding and distributes the stress away from the actual joint.

The second step in the process is to machine the reinforced tube end in such a manner that a line contact is made at the inner edge of the tube only, leaving a small wedge-shaped space extending away from this line contact to the outer edge. This contour is made very simply with a special high-speed form milling cutter. Milling is done in a special semi-automatic machine which mills two ends simultaneously. Figure 1 shows this milling machine set up to mill the two ends of a brace bar. With this machine it is merely necessary to place the tube within air-operated clamps (not shown in photograph) and press the button shown on the front of the machine. The tube is clamped in position, the two heads move up at high speed almost into contact, then a slow feed comes into play during the actual milling at the end of which the two heads return and the clamp opens. This machine is capable of handling approximately 700 milled ends per hour.

The third step in the process is to bring the machined tube end in contact with the other article under heavy pressure and apply a very high current for a short time. In light construction the pressure is approximately one or two tons; the instantaneous demand 150 to 250 K.V.A. during weld and the time interval 4 to 10 cycles of a 60-cycle current.

This is accomplished in special press welders of the type shown in Figure 2, which is used for the crank hanger. The crank hanger

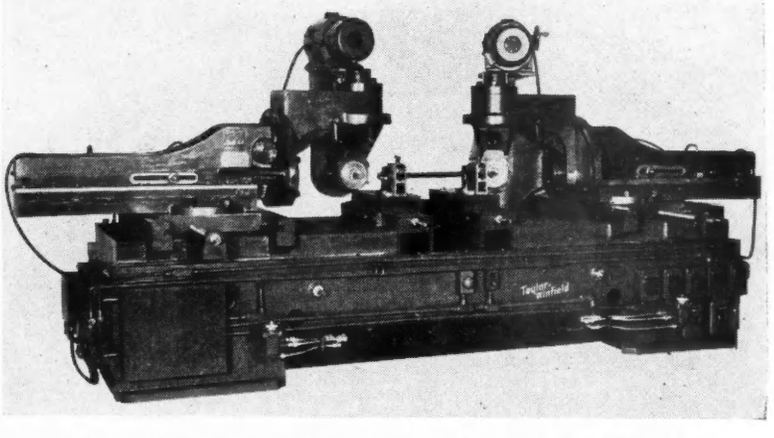


Fig. 1—Semi-automatic milling machine, set up for milling a brace bar

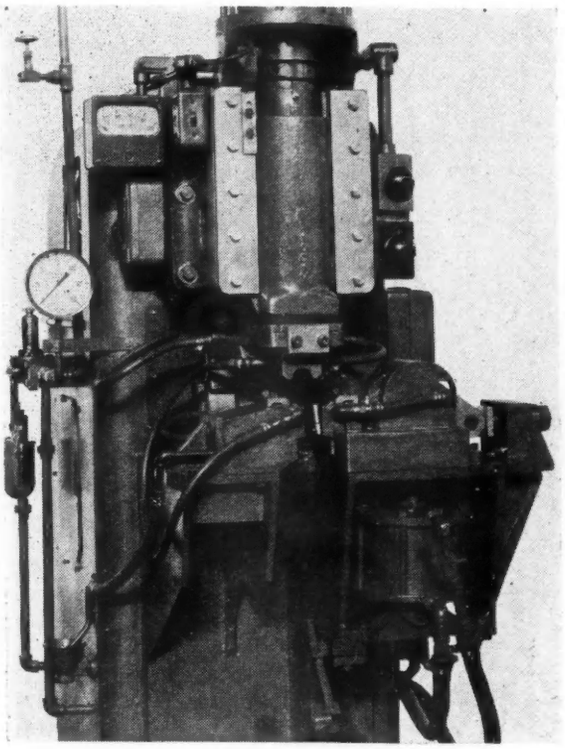


Fig. 2 — Special press welder with roller bearing air operated head

tube is placed over the horizontal mandrel, and the tube to be welded to it is clamped vertically by the Elkonite-faced jaws shown directly under the mandrel. When the parts are in position the button is pressed and a small horizontal air cylinder operates to locate the vertical jaws on the centerline. Another air cylinder operates to clamp the vertical tube by means of a toggle. Air is then admitted to the cylinder at the top of the machine, and the roller bearing head comes down, applying the pressure between the parts to be welded. The current is turned on by an electronic control for the desired length of time, and the cycle reversed. This entire cycle occupies from 2 to 3 seconds, depending on the type of joint being made.

Timing is provided by a Westinghouse Ignitron timer, which does not depend upon mechanical means for closing and interrupting the current. Timing is in terms of electrical cycles, and half cycles. In the case of 60-cycle current, this means that welds can be timed from 1/120 second, or any multiple to ½ second or longer. Two Ignitron power tubes, each conducting current in only one direction, close and interrupt the welding current. The effect is that of a single pole, single throw switch, synchronized with the current supply. In addition, a heat control is supplied whereby the magnitude of the welding current can be varied from 20 per cent to 100 per cent of maximum current by means of a small dial, thus avoiding auto-transformers, primary taps, and tap changes, and providing a smooth, stepless current adjustment. This heat control unit is small and is mounted on the right-hand side of the welder, where it is readily accessible for changes in current.

The result of this welding process is an absolutely clean joint that requires no finishing.

Exhaustive tests in bending, in tension and under vibration have shown the Hart joint to be stronger than the tube. For over a year, repeated destructive, vibration and actual road tests have been made on complete bicycle frames in order to subject the joints to every possible type of stress and the joints have consistently demonstrated ample strength. Change in grain structure is held to a minimum due to the rapidity with which this process takes place.

The Hart process is a true machine process in every stage. As can be readily appreciated from the photographs, the reinforcing and milling operations, once they have been set up, eliminate the human equation. The same is true of the welding operation, as the vacuum tube timing control holds the time interval to a definite figure, the current is accurately controlled and the pressure is applied mechanically. Consistent results and great strength are characteristic of this process of high production machine welding.

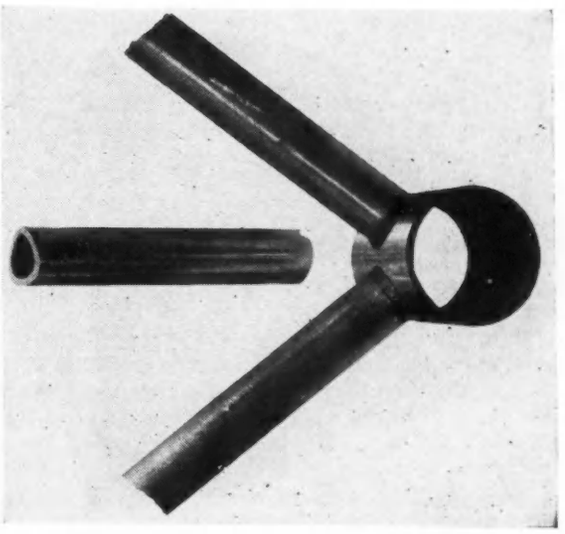
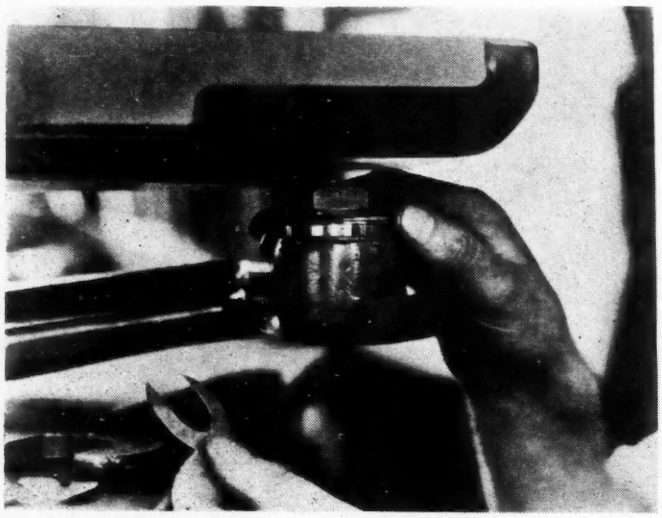


Fig. 3 — Photograph showing clean welded Hart joints, also milled tube end ready for welding



Production Lines

In the assembly of duplicator tables for Gorton Die Duplicating Machines, at the George Gorton Co., the exact 0.002-inch clearance desired between moving and stationary parts is obtained, by installing laminated shims. These solid shims, which simply peel for quick precision adjustment, provide a permanent adjustment feature during service.

Injection Molding

Working exhibits of injection molding made the biggest splurge at the recent ASTE convention in Detroit. Attraction was the endless production of golf tees, glass coasters, and a nifty if complex casting useful as an ash tray. Prominent organization seized the opportunity of supplying its line of powders for the entire output. We should judge that if all the gadgets turned out during the three-day session were laid in a heap—it would be a big heap.

Instrumentation

Vol. 1, Number 1, of "Instruments in Industry" marks the birth of what should be one of the most valuable services rendered by General Electric Co. Published periodically, it will cover electrical instrumentation for every engineering problem. Since this is one of the most pressing needs in industry today, many of our readers should become regular subscribers to this unique publication.

Hoosier Rambles

Recent trip to Indianapolis took us to the several automotive plants that form an important part of that community's industrial life. We were particularly impressed with the new home of Marmon-Herrington who now have planted the roots of an up and coming organization on the site of what used to be the old Duesenberg property. Nice planning and skillful arrangement of equipment has resulted in an excellent plant well suited to the amazing variety of custom-built automotive apparatus that Art Herrington delights in building. Good housekeeping and generous use of aluminum paint has created a fine work place for their mechanics.

The auto ignition laboratory at P. R. Mallory is of particular interest, featuring some beautiful panel board testing set-ups for ignition timers and the new auto lighting circuit controls for voltage and current regulation. One of the most recent activities here is the development of bi-metallic thermostatic materials, with some striking possibilities for the future. Mallory has about the largest proportion of research to productive workers that we have ever noted.

Flame Softening

A new process for removing the undesirable hardness along flame-cut edges of certain grades of steel, particularly the low-alloy high-tensile steels, is completely described in *Oxy-Acetylene Tips* for February, 1938. Flame softening like flame hardening is accomplished by a localized application of heat but there the resemblance ceases. In flame softening, the process utilizes an application of heat through multi-flame heads with sufficient additional heat so that the cooling rate of the cut surface is considerably slower than customary. You should become familiar with the details of this valuable process.

Vacuum Power

The other day we were shown a new device which affords a means of producing a dependable supply of vacuum power at all engine speeds and opens possibilities for wider use of vacuum devices on automobiles, trucks, and buses. Interesting feature of the design is that it can be adapted to any engine with the addition of a few relatively simple parts. While the device still is in the experimental stage and, consequently, is confidential we are giving you this advance information just to stimulate ideas.

On Malleables

Malleable iron development has been in the spotlight of late due to the introduction of a short-cycle process that cuts annealing time from a matter of days to but a few hours. Latest and most startling news concerns the development of pearlitic malleables for various highly stressed parts. One striking application is production of engine camshafts in pearlitic malleable iron with cams hardened by the now well-known Tocco process. It is said that one of the prominent passenger car builders has been experimenting with this idea.

Aircraft Lubes

Complete analysis of aircraft engine lubrication systems is found in the February issue of "*Lubrication*," a publication of The Texas Co. The brief treatise is rounded out by a section dealing with "airplane engine oil properties," considering such criteria as oil stability, carbon deposits, and notes on the selection of oils.—J. G.

Berlin Automobile Show

(*Continued from page* 447)

BMW, and three Opel models, now embody this feature, the chief virtue of which is that it saves weight.

A rather clever exhibit was staged by Baur & Schaurte, manufacturers of high-tensile, heat-treated screws. They exhibited a replica of an Opel L-head engine with the cylinder block and crankcase made of Plexiglass, a transparent synthetic material. Moving parts were standard Opel units, and the engine was driven by an electric motor. The object was to show how the use of high-tensile rolled screws reduces engine size and weight. Visible behind this engine was a second one of the same piston displacement and design, but built with standard screws, which was several inches longer and higher.

Great attention was centered on a streamline body made entirely of aluminum, exhibited on the stand of the Vereinigte Leichtmetal-Werke Hannover. It was designed by Professor Everling, who teaches aerodynamics at Berlin Technical College, and was mounted on a Mercedes-Benz 38-hp. chassis. Despite the fact that this wide body accommodates six adults, three abreast, it is 110 lb. lighter than the stock body and is claimed to be at least 30 m.p.h. faster. The peculiarity of the Everling design is the cut-off tail section. For perfect streamlining, a car must have an impractically long tail, and the headroom must be cut down. This form cannot be used even on racing cars, consequently compromises must be made. Professor Everling makes the body as high as necessary, but gives the top a true aerodynamic shape and cuts it off vertically at the rear. It is true that an eddy-producing plane is thus formed, but as the sides curve in at the rear, this area is much smaller than the cross-section at the line where the air flow breaks off in other so-called streamlined cars. Other features of the Everling body, which has an anodized finish, are that the windows are all flush with the outer surface, the door handles are sunk into the surface, and headlamp recesses are closed in daytime. All wheels also are enclosed. The top edge of the roof over the windshield is beaded, and catches air for ventilating the inside.

Backbone chassis types of square section are employed by Audi and in the two small DKW models, while the air-cooled Stoewer (the old Tatra design) retains the tubular backbone, which is also to be found on the rear-engined Mercedes-Benz car. Tubular frames of oval tube section are employed on the four-cylinder Mercedes-Benz and the new "Big Mercedes."

Independent front suspension is a feature of all German cars with the exception of the two Fords, the two lowest-priced Opels, one large Mercedes-Benz and a large Maybach car. The small cars generally have two transverse, superimposed springs, between the ends of which the wheels are suspended. Three Adlers, two small DKW's, three Hansas, the two smallest Mercedes-Benz, and the air-cooled Stoewer all have this type of front suspension. All others have combinations of links and transverse springs with the exception of the

Opels with their Dubonnet suspension, the large Mercedes, with links and coil springs, the 140 hp. Maybach model with high-level transverse springs and intermediary coil springs at the ends, and the Horch straight eights, with links in combination with two transverse springs arranged in one plane, one behind the other below the links.

No less than 30 of the 56 German car models for 1938 are furnished with banjo-type rear axles, the rear suspension being by semi-elliptic springs in most cases. Rear suspension on high level transverse springs is used on a number of models. The ends of the springs rest on upright struts welded to the ends of the axle, so the car is supported by its springs on a level with its center of gravity. This simple arrangement gives unusual lateral stability. Stabilizers are rare in Germany, but are found on the Opels, while the big Fords can be had with a hydraulic type of stabilizer called the Stabilus.

Only fifteen German car models out of the 56 are equipped for pressure-gun chassis lubrication, all the others having centralized oil lubrication, which is constantly gaining ground in Germany. Forty-two models are fitted with hydraulic brakes. Only the small Adlers, the Audi, the smallest DKW, the two Fords, and the cheapest Opel have mechanical brakes. Rack-and-pinion steering gears are employed on cars with independently sprung front wheels. Nearly all electrical equipment is of Bosch make. Thirty-two of the car models have 6-volt electrical systems. Bosch has developed a new generator of 50 per cent greater output without increase in size. Its continued output is 150 watts, instead of the former 90 watts, but it can be pushed to 225 watts. Voltage control, which is a feature of this new generator, is now the preferred practice. The push-button starter is coming to the fore again. Distributors are more nearly waterproof, and have been rendered more silent by reducing the moving masses and improving cam outlines. Contact breakers are now being fitted with hairpin springs, which require less room and are lighter. Vacuum ignition control units are now offered.

Solex carburetors are used on all German cars except the Opels and the two supercharged Mercedes-Benz.

The advent of the peoples' car, the "Volkswagen," is drawing nearer. Not only has the factory site been chosen, but work on the plant has begun. It will practically constitute a town by itself. But, as pointed out by the Chancellor in his opening speech at the Show, the government is in no particular hurry to get the new car in production. The German market is not yet saturated with cars of the present types. It is expected that when the saturation point is reached, the existing works will still be fully occupied in supplying cars for the replacement market. Then will be the proper time to introduce the Volkswagen, which is expected to open an entirely new market. For this reason it may be several years before the Volkswagen appears on the market.

Commercial Cars at the Berlin Show

will be described in an article by the Berlin correspondent of AUTOMOTIVE INDUSTRIES in its issue of April 9.

Automotive Gear Design Demands Modern Methods

(*Continued from page* 450)

surface of the oil, the oil flows in the bottom of the tank, up through each individual tube to the overflow at the top of the tank. This prevents the very hot oil from one gear interfering with the cooling of the adjacent gear. The gears to be quenched are hung on suitable hooks in the tank of oil, inside the individual tubes, until they are completely quenched.

In this condition, the gears have a well refined core of 240 to 270 Brinell, and a fairly well refined file-hard case. They are satisfactory for use without further treatment.

If it is desired to have additional refinement in the case, the gears may be heated to 1400 deg. Fahr. until they are thoroughly heated, and quenched, as before. A tempering heat of 350 deg. is sometimes used, and if a reduced hardness is desired, a draw as high as 500 deg. Fahr. may be used. This draw reduces the hardness to about Rockwell C55.

In a few instances gears are allowed to cool in the carburizing boxes. In such cases, they are given a reheat to 1400 deg. Fahr. for hardening, or sometimes a double treatment, such as a 1600-deg. quench followed by a 1400-deg. Fahr. quench. This is extra work and more expensive. Moreover, it tends to cause more distortion and promotes decarburization.

Just Among Ourselves

(*Continued from page* 451)

much alike, that new engineering ideas are introduced only for the requirements of the mass market and that their development is retarded because they cannot be introduced until it is certain that the mass market will accept them.

Our Suggestion

Our suggestion is this: Keep the Pierce-Arrow name and good will alive through purchase of the company's assets by a corporation which will represent every passenger car manufacturer in the industry. Let the Pierce-Arrow plant be a development laboratory for the industry as a whole, owned by the industry.

Produce a modernized version of a luxurious automobile which will be available to a few people who are willing to pay for the privilege. Make the Pierce-Arrow franchise available as a luxury line to any qualified dealer or any company in the industry.

As a by-product of Pierce-Arrow development produce racing cars for representing the United States in international contests.

Provide in the Pierce-Arrow plant an automotive engineering set-up which can draw for advice on the best engineering brains of the industry; a place where young engineers can be "farmed out" for training.

Provide in the Pierce-Arrow car a product on which new engineering ideas can be introduced in the earlier and more expensive stages, for the benefit of the industry as a whole.

Pierce-Arrow fits particularly well into such a plan because it is far enough away from Detroit and New York to be removed from local pressures.

The industry has demonstrated its ability to cooperate in effective causes. Here's one.

—HERBERT HOSKING

Automotive Materials

NEW DEVELOPMENTS

Ludlite—A New Composite Stainless Steel Product

A new stainless steel product known as Ludlite was recently announced by the Ludlum Steel Co., Watervliet, N. Y. Ludlite is a composite product comprising a surface sheet of strong, thin, stainless steel which is backed by a tough, non-metallic material. The backing is waterproof and flexible. The Silcrome facing and the backing material are permanently joined by a special process utilizing heat and pressure.

As a light gage steel is used, the new stainless product can be cut with heavy scissors, shaped or bent by hand and nailed, screwed, or cemented into place. Because of the backing, Ludlite can be readily attached to plaster, wood, fiberboard, concrete and other surfaces and a waterproof cement for this purpose has been developed. It is also claimed that the flexible backing deadens sound.

A new combining mill has been built for the exclusive manufacture of this product which is now being produced in rolls 2 ft. wide and 50 or 100 ft. long. It is also made in tiles 4 in. square.

At the present time two gages are being rolled for the Ludlite assembly, one 0.008 in. thick, the other 0.015 in. Two analyses are also made, one of the 17-chromium type and an 18 chromium-8 nickel type.

Water Tolerances of Gasoline Ethyl Mixtures

A major problem in connection with the use of mixtures of gasoline and ethyl alcohol as engine fuel involves the small water tolerances of such fuels without separation into two layers. In research paper RP 1059, Oscar C. Bridgeman and Elizabeth W. Aldrich of the National Bureau of Standards outline the results of their work in deriving a general empirical equation for the water tolerance of mixtures of gasoline and ethyl alcohol and evaluating characteristic constants for various gasolines which are indicative of the water tolerance of mixtures of these gasolines with ethyl alcohol.

An analysis of data previously presented on the solubility of water in mixtures of ethyl alcohol with 23 different gasolines, indicated that it was possible to correlate the results by means of a general empirical equation. This equation contains one constant characteristic of the particular gasoline under consideration, and values of the characteristic constants for the 23 gasolines are given. Evidence is presented regarding the agreement of the equation with the observed data, the difference between the observed and computed critical solution temperatures being 1.4 deg. C., and the difference between the observed and computed water tolerances being about 0.005 per cent of the total mixture.

Since the characteristic constant may be evaluated from a few solubility experiments with any particular gasoline, the equation can be used to compute the water tolerances at other temperatures or with other mixtures.

New Plant to Produce Vinyl Resins for Safety Glass

Vinyl resins for use in the manufacture of safety glass will be produced at a new plant just completed at Indian Orchard, Mass., for the Shawinigan Resins Corp.

Vinyl plastics in certain forms have properties which are highly desirable for plastic sheeting in laminated glass. They are high in impact and tensile strength and retain a greater degree of flexibility at lower temperatures than other plastics used for the same application. To date, however, the supply of vinyl sheet for making safety glass has been rather limited, the greater part of such glass being made with acetate sheet.

Vinyl plastics for laminated glass are also produced by the Carbide & Chemicals Corp. plant in Charleston,

S. C., in a form developed through joint research of that company and the Pittsburgh Plate Glass Co.

It is reported that the Fiberloid Corp. will be supplied with vinyl resins by Shawinigan Resins Corp. and will produce from them sheeting for use in laminated glass. E. I. duPont de Nemours & Co. is also erecting a plant for making vinyl resins presumably to be used in the production of vinyl sheet for laminated glass.

Vinyl resins are also being produced for use in plastics other than those employed in safety glass, but these have not yet been used extensively in the automotive industry although they have favorable characteristics for certain purposes and are adaptable for use by injection molding. They are, however, somewhat higher in price per pound than cellulose acetate which is now the principal material used in injection molding, but are also lighter in weight.

Some forms of vinyl products, one of which is produced under the name "Koroseal" by the B. F. Goodrich Co., are being employed in modified form for electric wire insulation, as in "Flamenol," a product of the General Electric Co. These insulating materials are somewhat similar to rubber in flexibility but contain no rubber and do not support combustion. They are also highly resistant to oils, acids, alkalies and moisture. Further, they have a lustrous finish and are available in a large range of colors which facilitates circuit tracing. Dielectric strength is high and ozone or corona do not crack the insulation.

A Lacquer Unaffected By Rust Inhibitors

Two new products, a lacquer that resists rust inhibitors and a metal finish for rubber, have been brought out recently by Maas & Waldstein Co., Newark, N. J.

The new lacquer, according to the manufacturer, is not discolored or otherwise affected by any of the commonly used rust inhibitors, and it is also resistant to humidity, salt spray, 10 per cent hydrochloric acid and other chemicals, as well as outdoor exposure. Additional claims made for the material state that it is tough, durable, and strongly adherent and will stand up well under stamping, forming, and other mechanical operations. It can be applied to aluminum, brass, copper, and other metals by dipping and spray-

ing, and it is said to air dry rapidly.

For imparting to rubber parts or products a metallic finish that will harmonize with the metals with which they will be used, the company offers a special bronze lacquer. With this lacquer it is possible to cover semi-stiff rubber with a strongly adherent, durable finish resembling brass, copper, bronze, aluminum, steel, or other metals. It consists of a special bronzing liquid to which metal powder of any kind is added just prior to use. The mixture is applied by spraying and is said to air-dry rapidly.

Bakelite Making Urea And Acetate Plastics

Plastics of the urea and cellulose acetate type have been added to the extensive line of plastics produced by the Bakelite Corp. and are being shown publicly for the first time by the corporation in an exhibit at the Museum of Science and Industry, Radio City, New York. Except for the polystyrol plastic announced a few months ago, Bakelite output has been confined chiefly, so far as plastics and synthetic resins are concerned, to phenolic materials. There are now added white and ivory translucent urea molding materials (which Bakelite is licensed to manufacture under Beetle patents) and the thermoplastic, cellulose acetate, suitable for both injection and compression molding.

General Plastics Introduces Phenolic Resin Adhesive

A new phenolic resin adhesive has been announced by General Plastics, Inc., North Tonawanda, N. Y. It is claimed that this material, known as 5116 resin adhesive, in solution in a hydrocarbon solvent, has exceptionally high bonding strength.

According to the producer, the new product is particularly efficient in bonding asbestos to sheet steel; rubber to metal or cellulose acetate materials; plastic molded parts; porcelain enameled parts; Cellophane or treated papers to steel.

When used as a coating, the 5116 resin adhesive is said to withstand a 50 per cent caustic soda solution indefinitely. It is also reported that it retains its bonding strength up to 100 deg. C. and that its softening point is between 115 deg. and 120 deg. C. (A.S.T.M.).

New Die-Casting Materials Proposed

Committee B-6, on Die-Cast Metals and Alloys, of the A.S.T.M., has proposed to add a new alloy, No. XXV, to the present A.S.T.M. specifications for zinc-base alloy die castings. This new alloy, which contains 1 per cent copper, is said to be intermediate in its physical properties between the present alloys Nos. XXI and XXIII.

Studies are now being made on two new magnesium alloys which appear to have desirable properties for die casting. The alloys in question have the following approximate composition: 9 per cent aluminum, 1 per cent zinc, 0.1 per cent manganese; 6 per cent aluminum, 2 per cent zinc, and 0.15 per cent manganese, the remainder being magnesium.

Disprove Claim Made for Beryllium Copper

It is learned from the Riverside Metal Co., Riverside, N. J., that recent investigations tend to disprove the claim that Beryllium Copper is absolutely non-sparking. Apparently, under certain conditions, the use of this material does not insure freedom from sparking.